

STACKER VS.
DOUBLESPEACE
(SEE PAGE 46)

COMPUTE

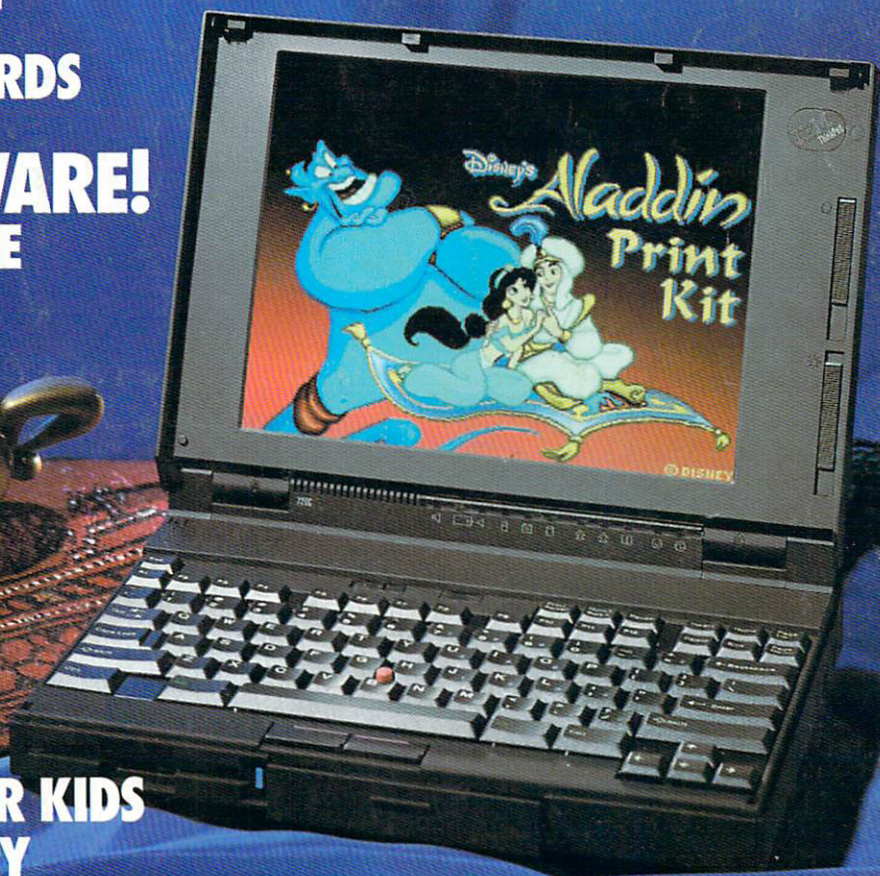
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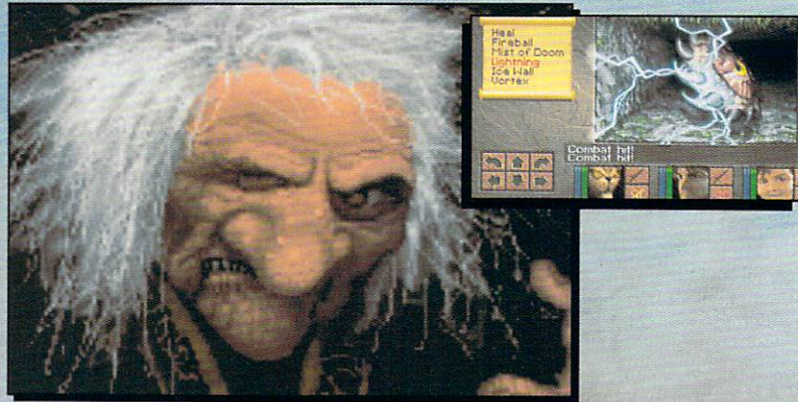
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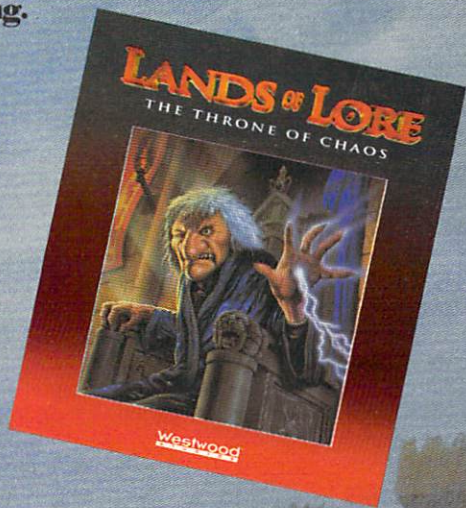
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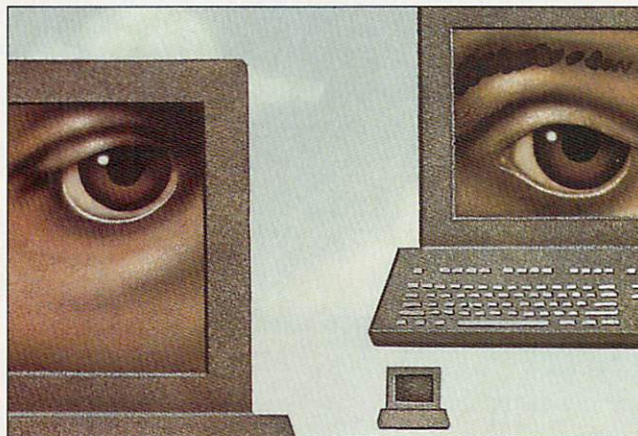
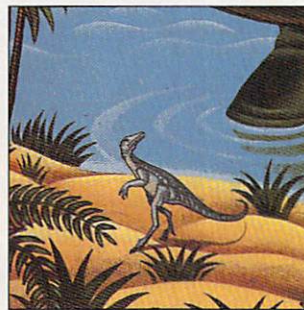
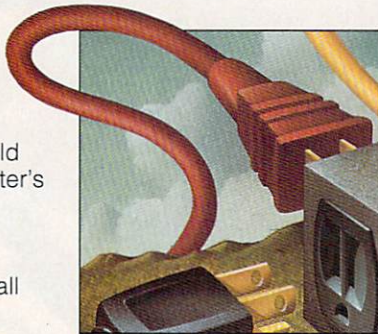
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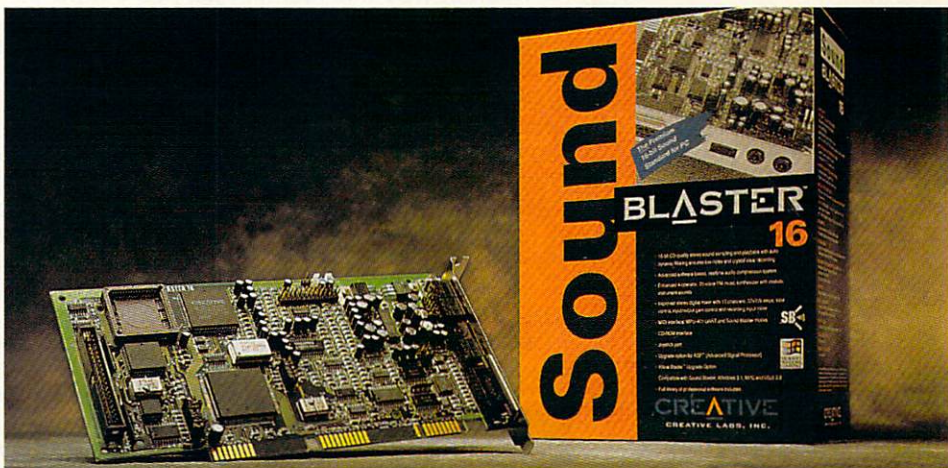
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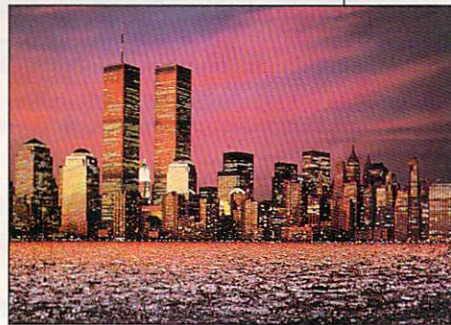
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Clifton Karnes

This is really the season for computer shows. Last month it was COMDEX in Atlanta, and this month it's PC Expo in New York. I thought that PC Expo, coming so soon after COMDEX, would be just a repeat of that show, but it wasn't. Of course, there were a lot of products I'd already seen at COMDEX, but there were lots of new ones, and some of them were outstanding.

One of the neatest products I saw at PC Expo was Tapestry, from Pixar. This Windows app creates stunning vis-

ual effects with fonts. You can, for example, make a word look as if it's constructed from chrome, wood, or almost any other material. Pixar also produces photographic-quality textured backgrounds and special add-in font effects. This program is a deal at \$199.



ual effects with fonts. You can, for example, make a word look as if it's constructed from chrome, wood, or almost any other material. Pixar also produces photographic-quality textured backgrounds and special add-in font effects. This program is a deal at \$199.

Teleconferencing is a topic that's been batted around for years, but only a few companies have done anything with it, usually using ultraexpensive dedicated hardware. Future Labs has a new twist on teleconferencing with TalkShow, a Windows program that lets any number of people, connected by modem or LAN, annotate a document in realtime so everyone sees everyone else's marks and comments. The ideal situation is for this visual conference to be accompanied by a tele-

phone conference call. If this isn't possible, however, the program offers a floating talk box, so the people connected can type in a conversation. A two-player TalkShow pack is \$395.

Microsoft has been busy lately, and the company showed a raft of new products at PC Expo. One of the most interesting was Microsoft at Work, which is a group of add-ins that make office equipment easier to use by improving its interface. The demonstration concentrated on the Microsoft at Work tele-

phone interface, which transforms the phone into a really intelligent device. A small high-resolution screen is embedded in the phone, and it shows all kinds of information, like who's calling now and who called while you were out. It also provides an easy way to manage your phone messages. Microsoft at Work is a little hard to describe, but I was impressed.

On the main show floor, Stac Electronics was countering Microsoft's new DoubleSpace with the introduction of Stacker 3.1. This new version of Stacker has a score of neat features. The most useful of these integrates Stacker into the operating system—just like DOS 6's DoubleSpace—so there are no longer two sets of system files to deal with. It also has some very well thought-out safety features. For example, it automatically flushes the SMARTDrive cache when you close Windows and go to DOS. For a general overview of Stacker versus DoubleSpace, see my "Windows Workshop" column in this is-

sue, which was written, by the way, before I saw Stacker 3.1. Stacker's upgrade price is \$49.95.

Behind closed doors, Hewlett-Packard was showing Dashboard 2.0, its second-generation Windows shell. Dashboard 1.0 was pretty cool, and this new version adds many new features, including snap-off quick-launch toolboxes. The interface is also much more configurable. Dashboard has a suggested retail price of \$99.

COMPUTE was impressed with Approach 1.0 when it was released in 1992. In fact, we gave the program a COMPUTE Choice Award as the best database product of the year. Approach 2.0, released late in 1992, was even better. This past June, Approach was acquired by Lotus, famous for 1-2-3, Ami Pro, and Freelance Graphics. Besides giving Approach the marketing muscle it needs, Lotus has introduced several small, but significant, changes to the product. The version being shown to the press at PC Expo has a more flexible interface (one that matches Lotus's other products) and was even easier to use than previous versions.

Do Visual Basic programmers have more fun? If they use Sheridan's VB Assist 3.0, they do. This Visual Basic add-in can double the productivity of almost any VB programmer. VB Assist adds two toolbars to the VB screen with features that make designing, coding, and managing projects amazingly easy. This superb tool improves on VB's already excellent interface; it's available for \$179.

All in all, PC Expo was a good show. Although I didn't get to see each of the 800 exhibits, I do think I bumped into most of the 85,000 attendees. □

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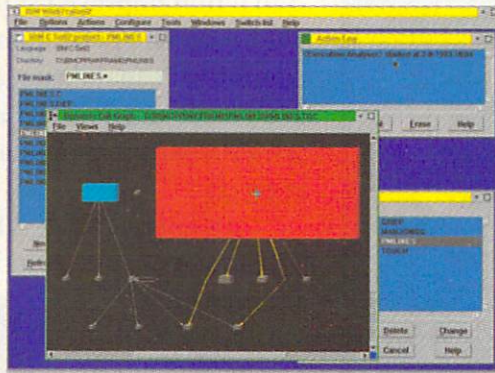
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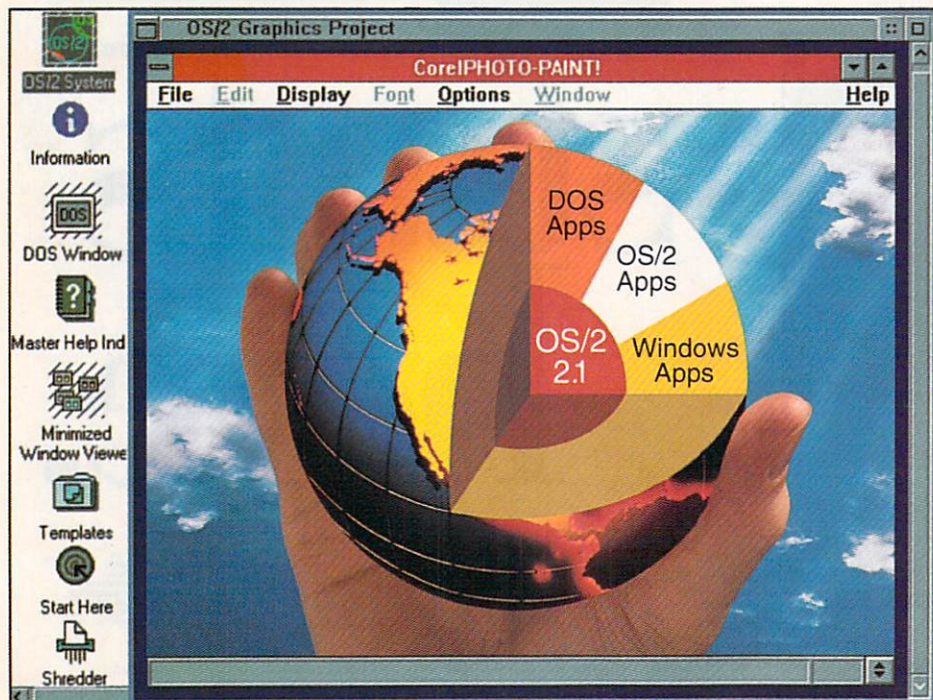
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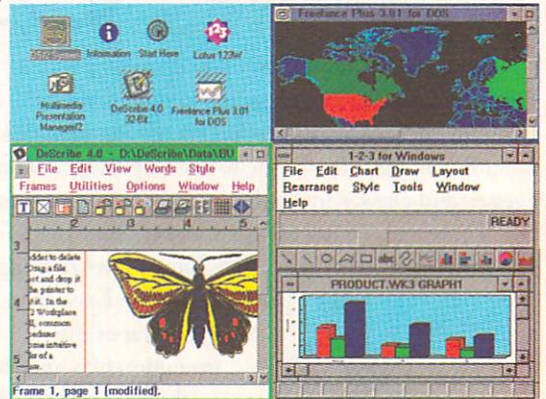
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world.

What you should know about your
computer's display system

SEEING IS BELIEVING

Have you ever wondered why Windows looks so different on your monitor from the way it looks on the monitor at the computer store? Or why your friend Joe's fonts appear so much crisper and clearer? Or how come his colors are so plentiful and pure and his graphics display is so much faster? The answer is simple. Like cars, washing machines, and lawn mowers, computer display systems come with a variety of options, and, of course, in a wide range of prices.

Since the introduction of Windows 3.0, with its support of high resolutions and 16.7 million colors, hardware vendors have been scrambling to find ways to make what shows up on your monitor faster and prettier. While the results are impressive—never before have type and graphics displayed so well on so many computer screens—the resulting plethora of display system types and sizes has become mind-boggling. You have 8-bit, 16-bit, and 24-bit color displaying at four or five different resolutions; graphics accelerators; local-bus adapters; analog and digital video; VGA and Super VGA—no wonder it's so confusing!

Let's see if we can't make it all make sense.

Your Display System

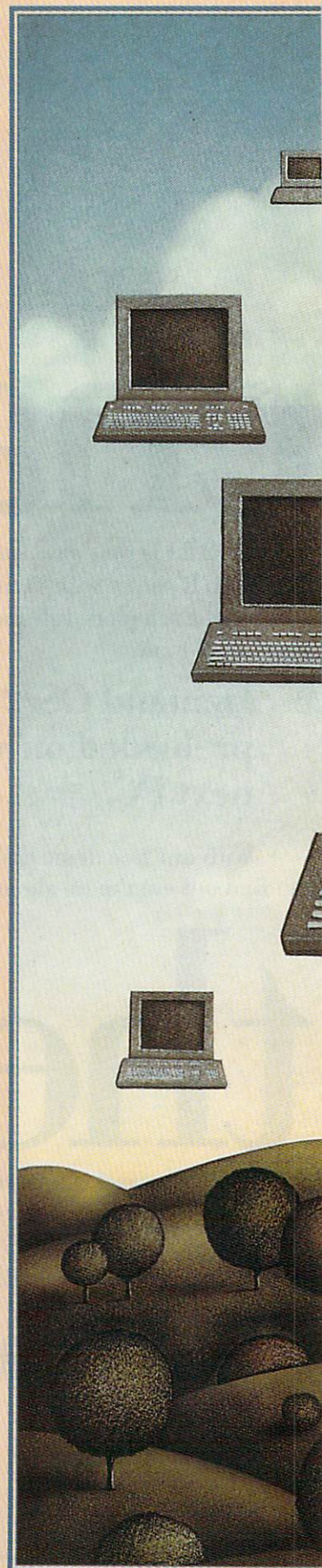
To display information, be it text or graphics, all computers require two components: a display adapter and a monitor. Display systems run in various modes providing different palettes and resolutions. Keep in mind during this discussion that for you to get the most from a display system, your display adapter and monitor must support the same modes. It does you little good, for example, to spend the extra money on a Super VGA display adapter if your monitor supports only VGA.

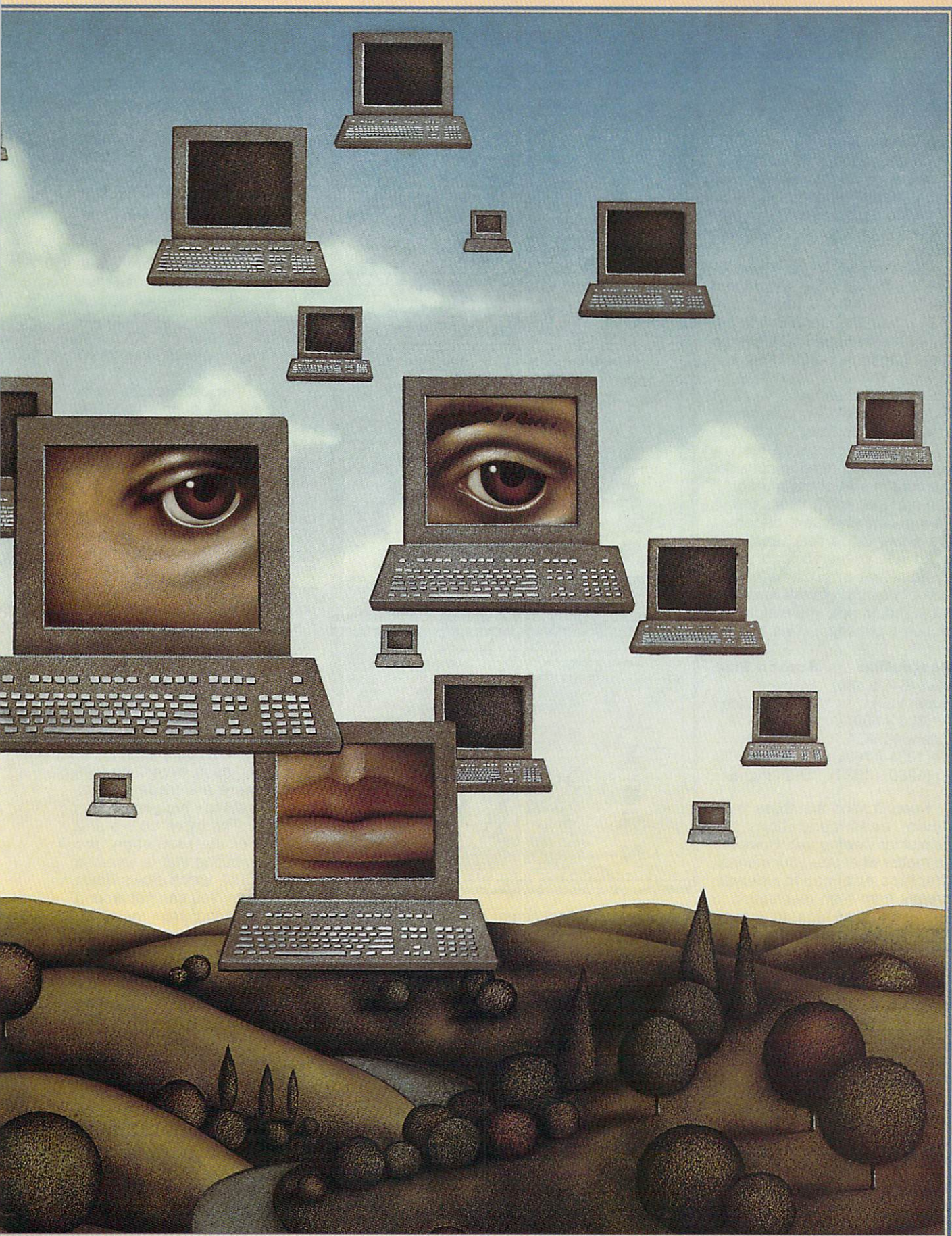
Pick a Card

Often called a graphics card, the display adapter is usually a separate card that slips into a bus slot on the motherboard (some computers have display adapters built onto the motherboard). The display adapter processes information from the computer and sends it to the monitor.

When looking for a graphics card, you should consider the resolution, number of colors (or bits per pixel), the screen refresh rate, and whether it supports interlaced or noninterlaced display. Also determine whether the card is accelerated. (Accelerated cards are discussed in the accompanying sidebar "Running Windows at the Speed of Light.")

By William Harrel





Resolution

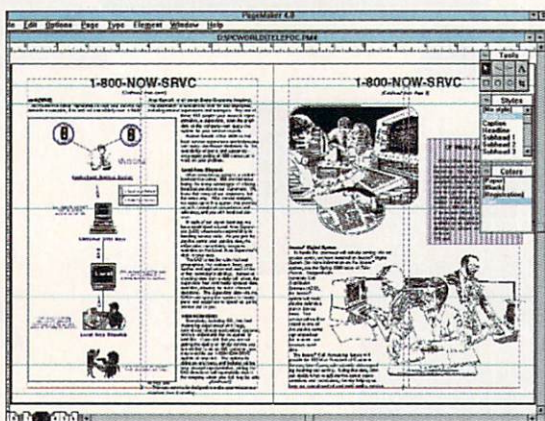
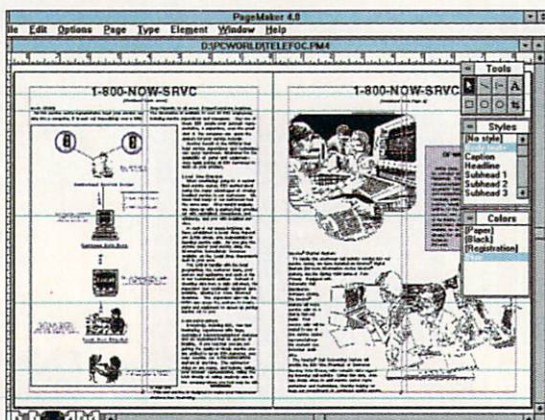
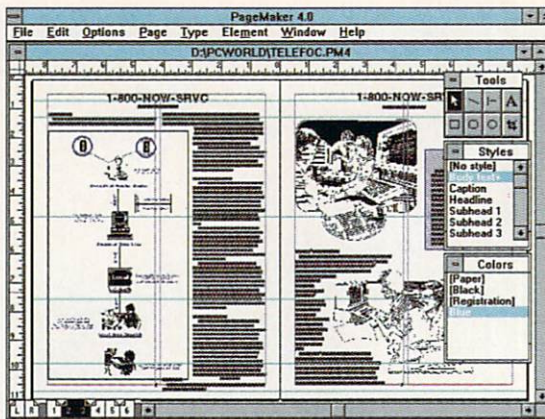
Resolution refers to the number of dots, or pixels, on the screen. The higher the resolution, the more information you can fit on the screen. In Windows that means that you can view more open windows at the same time, or, in a desktop publishing program, such as PageMaker, you get a better what-you-see-is-what-you-get (WYSIWYG) representation of how the page will print.

Standard VGA has a resolution of 640 pixels across and 480 pixels down (640 x 480). Super VGA mode is 800 x 600 or higher. VGA and Super VGA are the most common resolutions, but 1024 x 768 and even 1280 x 1024 (sometimes called Ultra or Extended VGA) are becoming increasingly popular.

When you choose a resolution, you'll also need to consider the screen size of the monitor. If you cram too many pixels onto a 14-inch monitor, text becomes too small to be read easily. A good rule of thumb is to use a system that approximates the size of the final printed text. This table should help you match resolution and monitor sizes.

Resolution	Screen Size
VGA (640 x 480)	14 inches
Super VGA (800 x 600)	15-16 inches
Extended VGA (1024 x 768)	17 inches or higher
(1280 x 1024)	19-21 inches

Keep in mind that these resolution recommendations are helpful for viewing text. However, no matter what size your monitor, graphics applications benefit greatly from high resolutions. If you edit graphics in CorelDRAW!, Micrografx Works, or some other application (and use a small monitor), you should choose a card that lets you switch resolutions, so you don't have to strain your eyes when editing text. Whether you use a 14- or a 21-inch monitor, editing graphics in 640 x 480 mode is hardly adequate. You'll get a much better WYSIWYG representation of what the final output will look like at 1024 x 768. Desktop publishers also benefit from the higher-resolution displays with large monitors. The idea is that the better your display, the easier it is to proof layouts onscreen, rather than by printing drafts. This saves both time and paper.



The higher the resolution of your display, the better the quality and the larger the editing area. From top to bottom, the resolutions of these screen captures are 640 x 480, 800 x 600, and 1024 x 768.

Presentations and multimedia applications also benefit from high resolutions.

Millions of Colors

Perhaps even more confusing than resolution is color. Graphics cards are rated by the number of distinct colors they can display on a screen at one time. The range is from 16 colors to 16.7 million colors, with 256 being the most common number of colors. The number of colors a card is capable of producing depends on its bits-per-

pixel rate. A rate of four bits per pixel, for example, provides 16 colors; a rate of 24 bits per pixel provides 16.7 million colors.

The 16-color model is the easiest one to use to demonstrate this concept. Since there are four bits per pixel, you have 4 x 4 (16) possible RGB combinations. As the number of bits per pixel increases, the possible combinations also increase substantially.

For most applications, 256 colors are fine. If you work with graphics, you should use high color. Most people, except for users of high-end photograph-editing software, such as PhotoShop or PhotoStyler, don't need 24-bit color.

(Note that just because a display is capable of only 16 or 256 colors, this doesn't mean that unsupported colors do not display. In Windows, for example, when an image calls for more colors than the graphics card is capable of, the additional colors are displayed through a process called dithering. Dithering mixes two or more solid colors to form another. If you have a low-resolution display that doesn't support many colors, you've probably noticed that some hues seem coarse. This is the result of dithering. In many applications, dithering is not a problem, but in graphics and photograph processing, where color purity is critical, it is not acceptable.)

Finally, as in everything else in life, there are trade-offs for these beautiful, high-resolution displays. The more colors and the higher the resolution, the more computing that is required of your CPU, which slows down your system. You can get around the demand that high resolution and numerous colors place on your computer by choosing an accelerated graphics card. Today's graphics cards come in four color standards, as depicted in the following table.

Bits/ Pixel	Mode Name	Colors
4	minimum color	16
8	pseudo color	256
16	high color	32,768
24	true color	16.7 million

Caution: Just because a display adapter claims 32,768 or 16.7 million colors doesn't mean it supports them at all resolutions. When you increase

the number of colors, the display adapter needs more memory to store the additional information. When looking at a card's color (and resolution) specifications, make sure it's capable of the number of colors you need at the desired resolution. Sometimes you can add RAM to a graphics card to increase resolution and color capabilities. You should also be careful that the card is shipped with a Windows driver (software that lets Windows use the card) that supports the number of colors and resolutions you need. If you don't use Windows, make sure you have the needed drivers for the applications you do use.

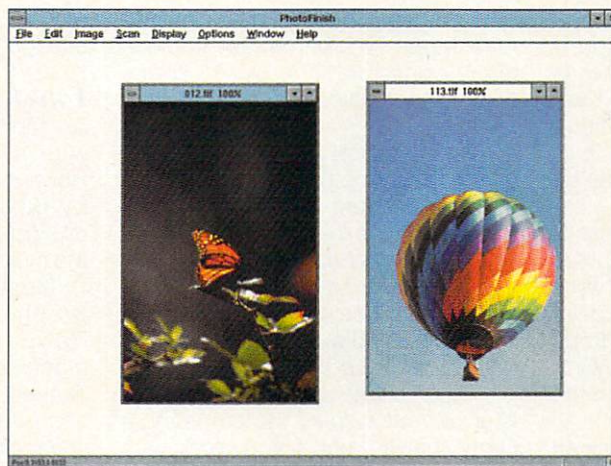
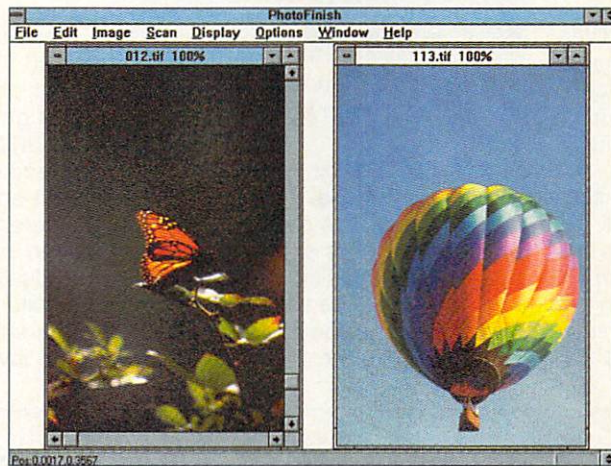
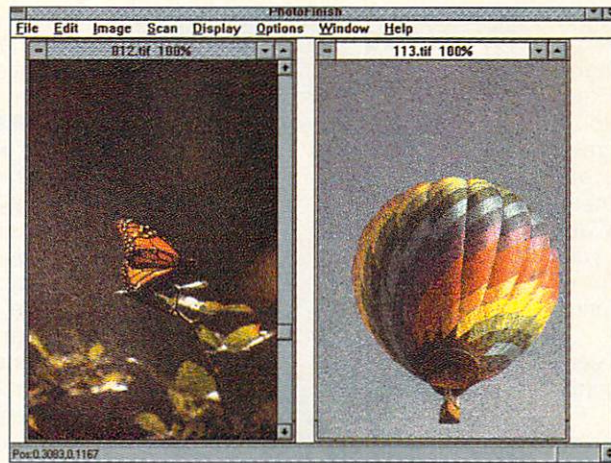
Refresh Rate

If you spend a lot of time at your computer, be on the lookout for a card with a high refresh rate. Your eyes will be forever grateful. The refresh rate is the speed at which the screen gets repainted. If the refresh rate is too low, your monitor flickers, which is annoying and hard on the eyes. It can cause headaches and lead to long-term vision problems.

Refresh rates are measured in hertz (Hz). A rate of 72 Hz means the screen is refreshed 72 times per second. Anything less than 72 Hz can cause noticeable flicker. Just because a card claims "up to 72 Hz" doesn't mean it supports that rate in all modes. Match the refresh rate to the number of colors and resolution at which you plan to use the card.

Interlaced Versus Noninterlaced

Also critical to how a display system treats your eyes is whether or not it's noninterlaced. In an interlaced display, the electron gun paints every other line on the monitor each time it is refreshed—first, even lines and then odd lines on the next trip down the screen—which causes flicker. Many graphics adapters claim to be noninterlaced, but if you look closely at the advertising material or documentation, you'll see that they are interlaced at higher resolutions. Remember that the monitor must also support noninterlacing in the modes you plan to run.



More colors, less dithering: With 16 colors (top) and 256 colors (middle), Windows dithers to compensate for the lack of pure colors. With 16.7 million colors (bottom), dithering is unnecessary.

Monitors

Once the display adapter collects a screenful of data from the CPU, the video signal moves on to the monitor. The monitor uses an electron gun to paint the picture. The electron gun, which scans back and forth very rapidly, causes phosphors on the inside of the screen to glow. On a

color monitor, the phosphors are red, green, and blue (RGB). Depending on the color capabilities of the graphics card, RGB combinations are mixed to create other colors—up to 16.7 million, which, by the way, is far more than the human eye can discern at one time.

The phosphors glow for only a small fraction of a second, so the electron gun must repaint (refresh) them many times per second. The electron gun paints the screen one line at a time. When it finishes one line, it moves down to the next. When it reaches the bottom of the screen, it moves back to the top. The rate at which the electron gun repaints the lines is the refresh rate. The rate that the gun moves from the top to the bottom is the scan rate. As mentioned, the two primary considerations when buying a monitor are its size and whether it supports the resolution and refresh rate of the graphics card in your system. Some other things to consider when purchasing a monitor include multiscanning, dot pitch, and screen type.

Before looking at monitor-specific concerns, however, let's briefly review the issues that affect both monitors and graphics cards.

Resolution. Remember that the monitor must support the resolutions of the graphics card, including the highest one you plan to use. The good news is that you don't have to worry about buying a monitor that supports the number of colors you need. All color monitors support as many colors as your display adapter can generate.

Refresh rate. The monitor also must have the same refresh rate as your graphics card at the resolutions you plan to use. Again, make sure the desired resolutions and desired refresh rates match. Just because a monitor supports 72 Hz at 640 × 480 doesn't mean it will at 1024 × 768.

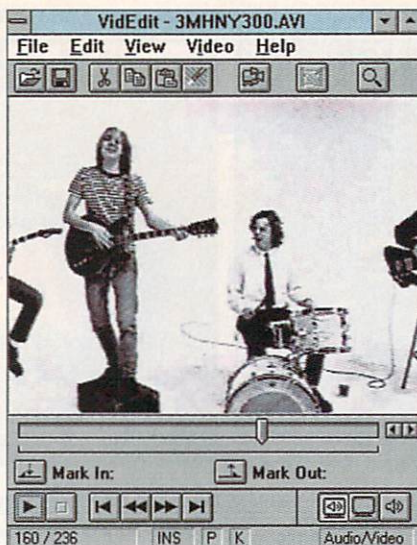
Screen size. Remember that it's important to match screen size to text size. However, where the size of your monitor really counts is in graphics and page layout applications. (Large monitors also help immensely when

giving onscreen presentations to sizable audiences.) When laying out a double-sided, two-page document, for example, the extra screen real estate provided by a large monitor is very helpful. A 19- to 21-inch screen provides a much more accurate WYSIWYG view of the final document. This makes it easier to judge how well elements line up and to assess your overall layout, and it saves a lot of time by reducing the number of printed drafts needed.

Having reviewed the primary considerations, we can turn to monitor-specific concerns.

Multiscanning. *Multiscanning* refers to the monitor's ability to synchronize refresh rates automatically. Basically, this allows you to use different graphics cards with the same monitor. It also allows you to switch in and out of DOS applications from Windows without having to manually adjust the monitor.

Dot pitch. The size of a monitor's pixels is measured by dot pitch. The smaller the dot pitch, the crisper and cleaner the display. A good rule to follow is that 16-inch or smaller monitors should have a dot pitch of 0.28 mm or lower; 17-inch or larger monitors can



Microsoft's *Video for Windows* lets your computer run full-motion video.

get by with 0.31 mm or lower.

Screen type. The screen type can also affect the quality of your display. All monitors should contain an antiglare mechanism, either a separate coating on the screen or a built-in filtering device. Some people prefer flat screens to the traditional convex

(or spherical) designs. The theory is that the flat screens more closely represent a sheet of paper.

Before You Buy

There are, of course, some other things to think about when upgrading your display system. Chief among these other considerations is price. Monitors and graphics cards are designed for a variety of applications, ranging from simple word processing to very high-end graphic design. Naturally, the demands of digital photograph editing are much higher than, say, balancing your checkbook in Quicken.

Prices for graphics cards and monitors run from reasonable to absurd. You can pick up a good Super VGA graphics card for between \$150 and \$500. Or you can go to the extreme and choose a high-end graphics design station card for upwards of \$3,000. When looking at the vast selection, it's difficult to tell why some cost so much more than others. The differences in quality and speed are often indiscernible. Monitor prices also fluctuate dramatically. However, since monitor prices generally vary directly with size, refresh rate, and resolution, and inversely with dot pitch, the price

Running Windows at the Speed of Light

A common complaint among users who switch from DOS character-based applications to Windows is that Windows' GUI (Graphical User Interface) slows down their computers. Depending on the machine in question, the performance hit can be substantial.

The reason for the sluggishness is that, unlike character-based applications, the Windows interface uses every pixel on your monitor to paint the screen. This requires hundreds of times more information flowing from the CPU to the screen than the average DOS application.

This rush of information causes an immense logjam at the bus port, where the display information is passed on to the graphics card. One way to relieve the bottleneck is with a graphics accelerator. These cards take the bulk of the display processing on themselves, which frees up the CPU to do more fundamental tasks, such as calculating your spreadsheet or sorting a mailing list.

A number of accelerator cards are available, ranging widely in price. The cost of the accelerator depends primarily on supported res-

olution, number of colors, and refresh rate. The cards also come in many configurations, with various coprocessor chips and RAM configurations.

While I am not usually reluctant to recommend one product over another, the field here is wide open. The important issue in this category is not what chips are on the board, but rather the board's performance. How fast does the card speed up screen redraw in Windows? Some claim up to 30-fold speed boosts, but double, triple, or quadruple the speed of your current display system is more likely, especially if you work with large graphics.

It takes a lot of horsepower to display thousands of colors at high resolution. Most Windows users should look into accelerated graphics cards. The immense increase in performance far outweighs the small increase in price. In some cases, you'll pay only \$50 to \$100 more for an accelerated version of a vendor's graphics card.

In other words, the only reason not to go for an accelerated card is if you believe you'll never need to dis-

play more than, say, 256 colors at 800 x 600 resolution.

Catching the Local Bus

Another way to speed up Windows is with a local-bus graphics card. However, the only way to get one is by buying a new computer—one equipped with a local-bus port on the motherboard.

Most computers interface with graphics cards at 8 or 16 bits. However, today's 386 and 486 machines process data at 32 bits. The result is a bottleneck between the computer and the display adapter. The local bus is a 32-bit bus port that holds a 32-bit adapter, which doubles the rate at which the computer can send data to the monitor.

If you're in the market for a new computer to run Windows, especially Windows graphics applications, such as CorelDRAW! or PhotoFinish, make sure your new machine is equipped with a local-bus display system.

Which is more important? An accelerated ISA-bus card will actually drive your display faster than an unaccelerated local-bus card.

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equally stunning
in color.



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Movies on Your Monitor

The word *video* brings to mind renting *Terminator 2* at the video store or watching Madonna on MTV. Recent hardware and software technology has brought motion pictures, or video, to the computer screen. As with the desktop publishing craze of a few years ago, it won't be long before virtually anybody can create and edit videos on a computer.

Personal computers, both Macintoshes and PCs running Windows, process video with one of two standards: analog or digital video.

Analog Video

Analog video is the standard used by TVs, VCRs, laser disc players, and camcorders. Analog video is typically stored on videotape or videodisc.

To use analog video with your computer, you'll need a special dis-

play adapter known as a video-in-a-window card. You can then run video from any VCR, TV cable, or other analog device. One of the more popular video cards is Creative Labs' Video Blaster.

Digital Video

Digital video is a digital form of video that can be stored as a computer file. Two examples are Microsoft's Video for Windows and Apple's QuickTime. These full-motion video standards run with or without a video board; however, for the best performance, you need the additional hardware.

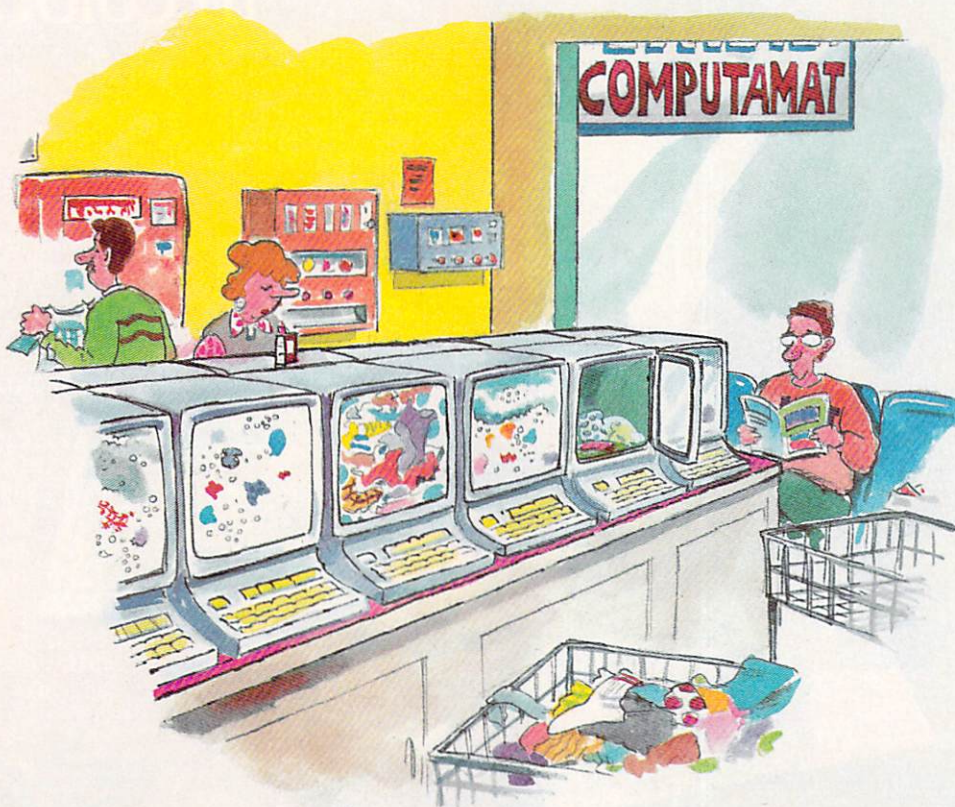
If you're looking for a quick, inexpensive, and easy way to put video in Windows, choose Video for Windows. It's easy to install and comes with several video strips to get you started.

ing seems to make a lot more sense than the pricing of graphics cards.

When you start doing your research, you'll find that there are hundreds of cards and monitors available. (That's the reason I didn't mention any

by name in this article. There are so many good ones that I didn't want to penalize vendors by not mentioning them.) The best test for a graphics display is to see it in action. If you can, get a demonstration. Ask to see the

applications you run displayed, and put them through their paces on a system with your prospective adapter and monitor installed. If you buy through mail order, make sure you get a money-back guarantee. □



TECHNOLOGY UPDATE

How to get surround sound without buying the theater...

An amazing new surround sound decoder turns your existing stereo into a five channel home theater.

By Chuck Anton

As much as I love renting videos, it's just not the same as seeing a movie in a theater. I remember the first time I saw *Top Gun*. I nearly jumped out of my seat when the planes flew overhead. One of the reasons movies seem so real is because they use surround sound to make it seem like you're actually there. Now, an incredible new device lets you use your stereo receiver to get that same surround sound in your home.

It takes more than just four speakers to get surround sound. You need to have some way of separating the signals. The new QD-1 Series II decoder does just that, and in a revolutionary way that rivals the best Dolby Pro-Logic and THX Systems available.

Wins over critics.

Noted audio critic, Len Feldman, reviewed the QD-1 for the September issue of *Audio Magazine*. He concluded that "...the QD-1 produced a completely accurate and realistic surround sound experience from a variety of videotapes and laser discs with Dolby surround encoding... the QD-1 delivers home theater sound the way it was meant to be heard."

Breakthrough 'L minus R.'

Back in the 1960's, Dynaco discovered that in addition to the right and left channels, a "difference" signal existed in a stereo recording, and aptly named it "L minus R." The QD-1 is able to decode Dolby Surround signals in a videotape or a laser disc because those spatial and depth cues have been matrixed into the "L minus R" portion of the stereo soundtrack. It does so passively, with no signal processing. What's more amazing, the QD-1 uses your main stereo amp to amplify the rear channels. You do not need any additional amplifiers!

Concert hall sound.

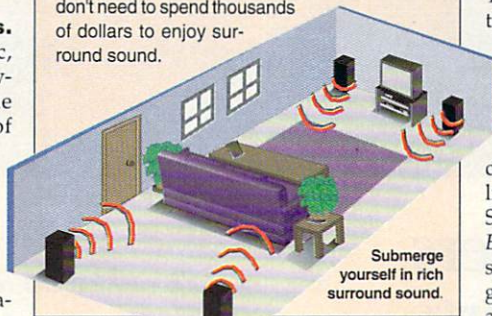
The QD-1 also decodes the ambience found in all musical recordings. This sense of space, or concert hall acoustics is present in all CDs and cassettes, especially live recordings. John Sunier of *Audiophile Edition*, a nationally syndicated radio program, says "If you're a surround sound buff who loves to listen to music, you'll find this \$79 passive black box superior to even the \$3000 THX or Dolby Pro-Logic processor."

The Secret of Surround Sound

Surround sound has become the rage of the '90's because it adds "depth" to stereo sound, giving you the home theater experience. Simply stated, it makes you feel like you're actually at a concert or a movie theater.

To "fill a room" with sound you need more than the two channels. And that's the beauty of the Dynaco QD-1, it provides five channels from any two channel stereo or TV.

Dynaco offers rear channel speakers specifically designed to integrate with the QD-1 decoder. You may also need our center channel speaker, the A10-V, if your two front speakers are more than eight feet apart. Adding this fifth speaker, or center channel, helps keep dialogue and important localization cues centered. So you don't need to spend thousands of dollars to enjoy surround sound.



buff who loves to listen to music, you'll find this \$79 passive black box superior to even the \$3000 THX or Dolby Pro-Logic processor."

THE PASSIVE ADVANTAGE

Passive. The QD-1 is passive, meaning it requires no AC current. It actually sounds better than active decoders, producing more clarity, more detail, no noise, a greater sense of space, and zero distortion. This superior passive system is a breakthrough unique to Dynaco.

Active. All Dolby Pro-Logic decoders (stand-alone or built-in units) are active. This means they decode and amplify the signal electronically. The active way induces noise and distortion, hindering the home theater experience. This is an example where "more is less." Spending thousands on an active system will not give you the performance of the QD-1.

The QD-1 decoder makes your movies come to life. Surround sound brings the theater experience home to you.



Quick and easy installation. Hook up is easy. The QD-1 connects to the speaker outputs on your amp. The speaker leads then run to each of your four (or five) speakers. The rear channel speakers may be small; we recommend the AW-1s at \$99 a pair. They come with mounting hardware, a key-hole slot for flush mounting, and have an attractive all-weather gun metal aluminum finish.



The AW-1 rear channel speakers integrate perfectly with the QD-1.

Factory direct offer. The QD-1 is so new you won't find it at your local department store. To introduce this product, we are offering it direct to you for a limited time special offer. By ordering now, you can save a substantial amount of money.

Risk-free home trial. Let's face it. The best way to evaluate surround sound is in your home, not in a showroom. That's why we're offering this risk-free home trial offer.

We're so sure you'll be delighted with the quality of these products and the surround sound experience that we are giving you 30 days to try them for yourself. If they're not everything we say, return them for a full refund.

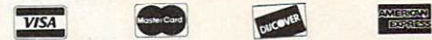
QD-1 surround sound decoder.....\$79 \$6 S&H
Speakers designed by Dynaco for the QD-1:

AW-1 two rear channel speakers\$99 \$6 S&H
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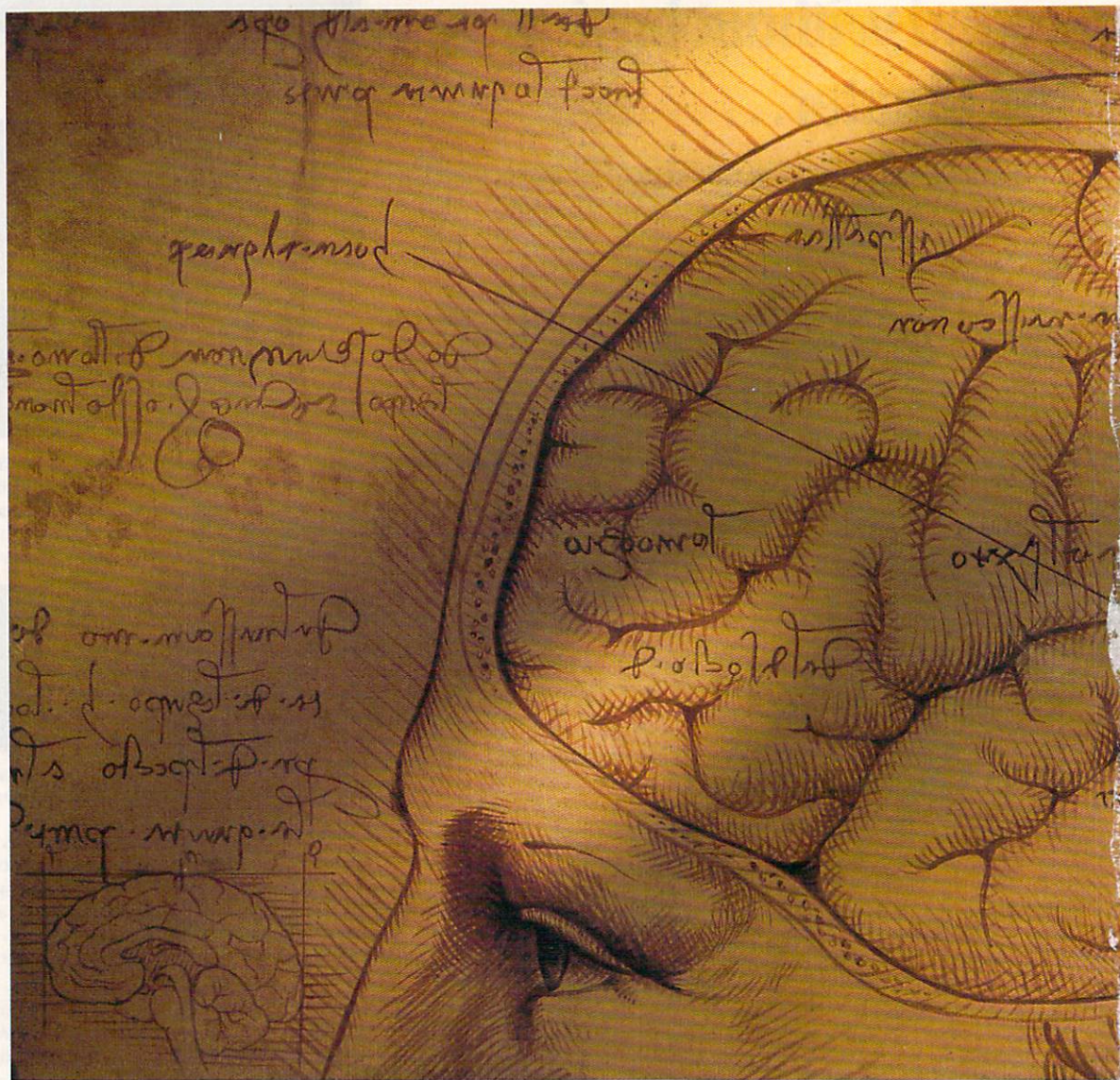
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Circle Reader Service Number 108

TEST LAB

Edited by Mike Hudnall
Reviews by Tom Benford

As you make your way through the reviews of this month's notebook computers, paying attention to prices, performance, and important features, the professional in you will doubtless note with approval how well this technology could serve your purposes and make you more productive. Practical, sensible, and well designed, these notebooks could be great for you or your business and could possibly give you just the competitive advantage you've been looking for.

If you're like me, however, the kid in you will probably be wowed by the latest innovations in these notebooks, like the built-in bubble-jet printer in the Canon notebook or the ergonomically designed pointing devices and the PCMCIA slots on several of the units we evaluated. Then there are the features that, though not really new, continue to impress because manufacturers keep finding ways to make them better and less expensive—features like hard drives, color displays, and power management.

For this Test Lab, we asked for 486 notebooks with 4MB of RAM and hard drives of at least 80MB.

As you'll see when you peruse our grid of features, these notebooks have 486 chips from four different manufacturers (Cyril, IBM, Intel, and Texas Instruments), and their speeds range from 25 MHz all the way up to 50 MHz. We could have tested notebooks with 8MB of RAM, but since most come standard with 4MB, and since we felt most COMPUTE readers would go with 4MB, that was our choice. As for the hard drives, we had no trouble at all coming up with large ones. In fact, the smallest ones were 120MB, and a couple of notebooks sported 200MB drives, more than enough space to take care of business on the road.

It's a sign of Windows' acceptance, I think, that every notebook we tested came with Windows and a pointing device of some kind. MicroElectronics even calls its computer the WinBook. So if you want to do Windows on the road, these notebooks are ready.

It's also worth noting that the manufacturers of these notebooks have put a premium on expandability. Now upgrading memory, adding communications hardware, and hooking up to a network are easier than ever. Docking stations, expansion boxes, and port replicators have helped; I think that PCMCIA slots and cards will help even more while eliminating much of the bulk and complication of earlier solutions.

AST RESEARCH
16215 Alton Pkwy.
P.O. Box 19658
Irvine, CA 92713-9658
(800) 876-4AST
(714) 727-4141

Suggested retail price: \$4,199 with 80MB drive; \$4,499 with 200MB drive, Windows 3.1, and AST SmartPoint trackball
Warranty: one year, parts and labor, including 48-hour repair upon receipt at AST (AST pays freight each way)

To see how these notebooks performed, look to the bar graphs with benchmark data. There you'll find not only performance ratings based upon the Norton Indexes but also real-world test data involving a word processor, a database, and more. We had planned a test involving Windows spreadsheet calculations; however, we had to scrap it, since all of these 486 notebooks were able to perform complex numerical spreadsheet calculations so quickly that performance differences were negligible. In addition to the application benchmark data, you'll find the results of our battery depletion test.

If you compute on the road and want information about the latest and greatest in notebook technology, read on. Test Lab has reviews, benchmark data, and feature information you can use.

MIKE HUDNALL

AST POWEREXEC 4/25SL COLORPLUS

Looking for a high-performance color notebook with a genuine 25-MHz Intel 486SL CPU? Then you'll want to learn more about AST's PowerExec 4/25SL ColorPlus notebook computer.

AST offers the PowerExec 4/25SL with three different displays. The 4/25SL Color version features a passive matrix color LCD screen, a 25-degree horizontal viewing angle, and a lower cost than the 4/25SL ColorPlus, which comes equipped with an active matrix color display that affords a 70-degree viewing angle and brighter, more vibrant colors. AST's monochrome version of this notebook, called simply the 4/25SL, can display 64 shades of gray with a 45-degree viewing angle. Both of the color models have 9.5-inch (diagonally measured) displays and can support 256 simultaneous colors at 640 x 480 resolution. Externally connected monitors can dis-



play 800 x 600 resolution with 256 colors, and you can use the external monitor simultaneously with the notebook's LCD.

AST provides plenty of power management support in the 4/25SL ColorPlus, and computing sessions well in excess of four hours were common during my review of the unit. With all of the power management options turned off, the nicad battery will still provide in excess of two hours of continuous use before you need to recharge it. This great charge life is attributable to AST's 3.3-volt low-power memory designed specifically for its notebooks (5 volts is the usual current drain in conventional designs).

A medium and charcoal gray color scheme gives the 4/25SL ColorPlus a smart, businesslike appearance. With this notebook, AST includes a nifty detachable miniature trackball, which snaps on the front of the machine just below the space bar. The manufacturer has positioned the two buttons on either side of the ball; I found this pointing device to be exceptionally well designed and easy to use. It gets its power from a dedicated port concealed behind a spring-loaded panel, and the connection is made automatically when you snap the trackball on the notebook.

The keyboard has all of the features serious users will favor: dimpled F and J keys, good key spacing, contoured key tops, a dedicated inverted-T cursor control pad, an embedded numeric keypad, and a light, crisp touch. AST provides a row of LEDs with icons under them to help you keep up with power, battery status, hard and floppy drive activity, and lock key status.

The 4/25SL ColorPlus provides two Type II PCMCIA expansion slots for adding options, and you can expand the standard memory configuration of 4MB up to 32MB, using the two user-accessible memory sockets. Since the i486SL CPU has an internal math

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P.O. Box 5048
123 East Paularino Ave.
Costa Mesa, CA 92628-5048
(800) 848-4123
(714) 438-3000

Suggested retail price: \$2,499 for Model 1 with 85MB drive; \$2,799 for Model 2 with 135MB drive; \$2,999 for Model 3 with 180MB drive; \$48 for six-pack of print cartridges; \$43 for print head
Warranty: one year, parts and labor

coprocessor and 8K of internal cache memory, it's unlikely that you'll outgrow the power this notebook can provide, especially with additional RAM installed in it.

The PowerExec 4/25SL ColorPlus is bound to appeal to the discriminating user who wants a superior color notebook.

Circle Reader Service Number 371

CANON NOTEJET 486

Canon has taken portability a step further with its printer-equipped, 486-based NoteJet 486 Model 2.

The NoteJet has a Canon Bubble Jet printer integrated right into the case of the computer, making this truly a portable office that will fit easily into a briefcase. The printer is functionally identical to the Canon BJ-130e in that it uses a head configuration with 64 nozzles and provides a maximum print resolution of 360 x 360 dots per inch with a maximum print speed of 116 characters per second. Because it also emulates the IBM ProPrinter X24E and the Epson LQ-510, you have real printing versatility. An automatic sheet feeder capable of holding ten sheets at a time is also built into the printer portion of the NoteJet, and the Bubble Jet ink cartridge yields approximately 100,000 characters before it requires replacement.

The heart of the NoteJet, a Texas Instruments 486SLC CPU



running at 25 MHz, endows the machine with respectable performance while maintaining a miserly current draw from the machine's nicad battery.

A Cyrix CX83S87 25-MHz math coprocessor can be installed as an option should your work require enhanced math coprocessing, and you can expand the NoteJet's standard RAM configuration of 4MB to 6MB, 8MB, or 12MB with the optional SIMM board that mounts in a single available SIMM slot. You can easily install either of these upgrade options, since both the math coprocessor socket and the SIMM socket are accessible via a snap-off cover on the bottom of the machine. This is a nice touch Canon added here, since installing such upgrades on other notebook computers usually requires disassembly of the computer by a technician. For adding other options, you have two PCMCIA card slots behind another snap-off panel on the left side of the NoteJet.

A wand-style pointing device provided with the NoteJet plugs into the machine's mouse-or-keypad port. Although Canon calls it a trackball, that name doesn't conjure an accurate mental picture of what it really looks like. A palm-size unit, the device connects to the machine's port via a 24-inch cable. You use your thumb to control a marble-size ball while your index and ring fingers activate the dual buttons at the front of the unit, mounted one on top of the other. At first this configuration seems awkward, especially if

TEST LAB

you're accustomed to a desktop mouse or a large-ball device, but you get used to it after a short while. If there's one weak spot in an otherwise excellent machine, I think it's this pointing device. Of course, you can always substitute another pointing device more to your liking.

The LCD screen displays 16 levels of gray at 640 x 480 resolution, and you can plug an external SVGA monitor into the notebook via the 15-pin D connector located at the rear of the unit.

The Canon NoteJet 486 is a very good Windows-ready computer for people on the go who want to have a printer available whenever—and wherever—they compute.

Circle Reader Service Number 372

EPSON ACTIONNOTE 4SLC/25

A truly compact notebook PC that has a good assortment of standard features, Epson's ActionNote 4SLC/25 is convenient to tote, provides good performance,

EPSON AMERICA
20770 Madrona Ave.
Torrance, CA 90503
(800) 922-8911 (in USA)
(800) 463-7766 (in Canada)

Estimated street price: \$1,429 with 80MB drive; \$1,499 with 120MB drive; \$1,699 with 120MB drive and fax/data modem
Warranty: one year, parts and labor; includes on-site service

and is easy on the wallet.

With a textured, charcoal gray case, the stylish ActionNote is the thinnest notebook covered here, measuring just a tad over 1.5 inches thick with its lid closed. It has a footprint just slightly larger than a sheet of letter paper, measuring 8.7 x 11 inches; and with a weight of only 5.5 pounds with its rechargeable nicad battery installed, it's certainly no burden to take along with you.

A Logitech TrackMan trackball, included as standard equipment with the ActionNote, plugs into a mouse-or-keyboard port on the left side of the machine. You also



get a good-quality compartmented carrying case as part of the standard package, along with a mouse-or-keyboard adapter for the machine's PS/2-style port.

The standard 4MB of RAM will meet the computing needs of many of COMPUTE's readers; if necessary, however, you can expand the memory to 8MB. The ActionNote includes 256K of video RAM and uses a paper-white, two-film CCFT (Cold Cathode Fluorescent Tube) backlit monochrome LCD which measures a generous ten inches diagonally. The LCD is capable of displaying 64 levels of gray at 320 x 200 resolution and 32 levels of gray at 640 x 480. Slider controls allow you to adjust the display's brightness and contrast, and a 15-pin D connector lets you attach an external monitor (simultaneous display of both the LCD and CRT is supported).

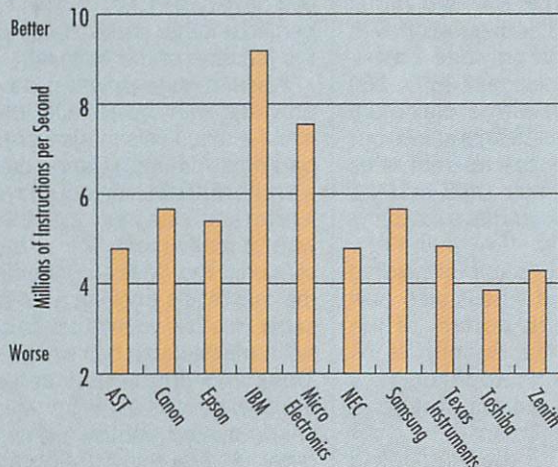
The Cyrix 486SLC CPU at the heart of the ActionNote runs at 25 MHz. To add number-crunching muscle for handling more demanding applications, you can add an optional Cyrix CX387SLC or Intel 387SX numeric coprocessor.

The keyboard features a moderately light touch and short key travel, along with a very nice feel. Bumps on the F and J keys confirm home row position, and an inverted-T cursor control pad makes moving around the screen easy. Epson also provides an embedded numeric keypad.

The review unit came equipped with a 120MB hard drive, although you can order the ActionNote with an 80MB drive. You can also install an optional internal 2400/9600 fax/modem

CPTS MIPS TEST AVERAGES

The CPTS MIPS Tests are a series of proprietary tests which measure the system's speed in MIPS (Millions of Instructions Per Second) to give a numerical profile of its performance. The tests time and count general instructions, integer instructions, memory-to-memory operations, memory-to-register operations, and register-to-register operations, and they automatically calculate MIPS task averages based on these discrete test results.



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 If a child of mine does not survive me, such deceased child's share shall be distributed in equal shares to the children of such deceased child who survive me, by right of representation. If a child of mine does not survive me and has no children who survive me, such deceased child's share shall be distributed in equal shares to other child(ren), if any, or to their respective children by right of representation. If no child(ren) survive me, and if none of my deceased child(ren) are survived by child(ren), my residuary estate shall be distributed to Martha Parsons, Hiawatha, Iowa 52233.
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TEST LAB

(Epson installed one on the review machine). WinFax Lite and BitCom come preloaded on ActionNote configurations ordered with the modem installed.

A row of LEDs with illuminated icons below them lets you know the status of the power, the battery charge, AC power (whether it's being used), and floppy and hard drive activity, as well as whether the caps, scroll, or numeric locks are in effect.

With prices ranging from about \$1,399 for the base model to \$1,649 for the configuration as reviewed, the ActionNote provides a way to get 486 processing muscle without breaking the bank.

Circle Reader Service Number 373

IBM THINKPAD 720C

IBM packs a lot of computing punch into its ThinkPad 720C. For starters, it has the biggest, brightest color LCD I've seen on any notebook to date, and its IBM 486SLC2 CPU runs at a brisk 50 MHz. If I've piqued your interest already, read on. You'll find that

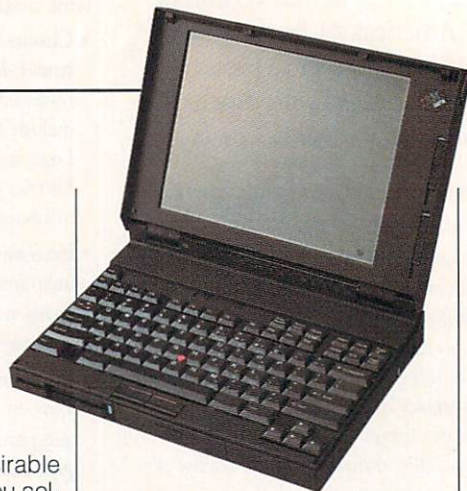
IBM PERSONAL COMPUTER
Box 100, Route 100
Somers, NY 10589
(800) 772-2227
(914) 766-1900

Direct price: \$4,695
Warranty: three years

there are lots of other desirable features in this take-it-with-you color notebook from Big Blue.

The ThinkPad's case features squared edges and sharp corners; no frills or nonfunctional embellishments are to be found. That isn't to say it's unattractive, however. Quite the opposite is true. The case is molded in a handsome matte black plastic, which resists fingerprints well (but tends to show dust and dirt). The overall appearance of the machine tells you it's a serious device that's ready to do business.

Lifting the ThinkPad's lid exposes the 10.5-inch TFT (Thin Film Transistor) 4096-color LCD, which is a joy to view. The LCD screen can display VGA at 640 x 480 resolution. Slider controls at



the right side of the LCD adjust brightness and contrast, although I found the display to provide excellent viewing, even in bright light, without my having to change the settings.

Below the display a bank of LED indicators keeps tabs on the system's status. They show the status of the speaker, AC adapter, power, battery, hard disk, and floppy disk, as well as the caps, scroll, and numeric locks.

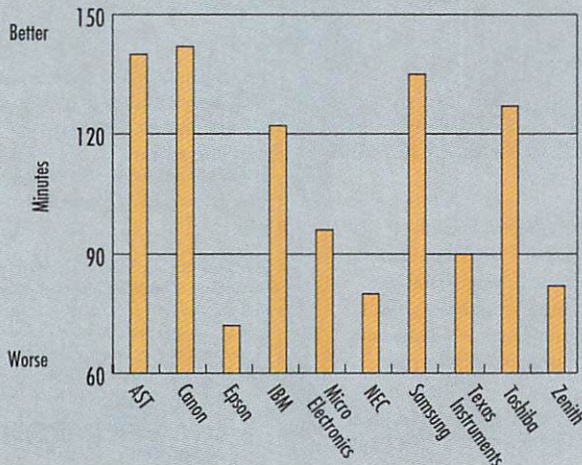
I found the ThinkPad's keyboard well laid out with regard to key spacing and key-top contour; raised dots on the F and J keys confirm home row position for touch-typists, and there's a separate inverted-T cursor control keypad, as well as an embedded numeric keypad.

Just above the B key, nestled between the bottoms of the G and H keys, is the ThinkPad's pointing device, an elevated red button that looks like a pencil eraser with a case of sunburn. Below the space bar, at the edge of the case, are two flat keys, each about one inch long; these correspond to the control buttons on a standard mouse.

While the idea of an integrated pointing device is good, I personally didn't care for the "eraser-ball" built into the keyboard. For my taste (and touch), it was too sensitive, and having the action buttons separate resulted in awkward operation. Suffice it to say that I found this setup anything but intuitive. I used the embedded pointing device throughout the review to give it a fair shake, but I must admit I was happy to

BATTERY DURATION TEST

The Battery Duration Test is performed with all power-saving functions deactivated to provide realtime charge-life expectancies for the notebooks' batteries. A proprietary program which creates, reads, writes, and erases files and writes a time-stamp log entry at the end of each cycle is used to keep the CPU, hard drive, and video display busy to simulate constant use during the test. The elapsed time between the start of the test and the last recorded log entry before the battery fails totally is calculated and recorded.



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get back to my desktop PC with a trusty old Microsoft mouse attached to it.

The ThinkPad 720C comes equipped with a 50-MHz IBM 486SLC2 CPU, a 180MB hard drive, and 4MB of RAM as its standard configuration. Two PCMCIA slots are also provided to accommodate any expansion options you may desire. For power users, this machine is a great choice.

Circle Reader Service Number 374

MICRO ELECTRONICS WINBOOK

Designed specifically with the Windows user in mind, the WinBook from Micro Electronics comes with plenty of desirable standard features that are frequently extra-cost options with other notebook computers.

Notebook describes the WinBook well, since it occupies about the same amount of space as an average three-ring binder and weighs in at a trim and easy-to-tote 5.4 pounds with its rechargeable nickel-metal-hydride (NiMH) battery installed.

The WinBook's standard configuration includes 4MB of RAM, a 120MB hard drive, a 2400-bps modem and 9600-bps send/4800-bps receive fax. For adding options, there's a Type II PCMCIA slot, an increasingly pervasive feature in this latest generation of notebooks.

For its CPU, our review WinBook uses a 33-MHz Cyrix CX486SLC rather than an Intel chip. Described in the WinBook's manual as an "enhanced version of the 80386 CPU," the Cyrix chip "includes a built-in 1Kbyte cache to increase the speed of data access."

The overall design of the machine is quite good, and it's evident that plenty of thought went into the placement of various system components. For example, a trackball is built into the WinBook; the manufacturer places this point-

MICRO ELECTRONICS
1160 Steelwood Rd.
Columbus, OH 43212
(800) 468-2162
(614) 481-7460

Suggested retail price: \$1,799
Warranty: one year, parts and labor

ing device conveniently between the two wrist-support pads below the keyboard. About the size of a marble or gum ball, the trackball is flanked by its two buttons. While the trackball eliminates the need for an external mouse, you can still use one if you want.

Controls for adjusting the brightness and contrast of the LCD are also conveniently located—at the right side of the screen, along with LED indicators for power, floppy drive activity, hard disk activity, suspend mode, and the status of the Num Lock, Scroll Lock, and Caps Lock keys. The WinBook has an easy-to-look-at ten-inch display; the 512K of video memory allows 640 × 480 resolution for the internal screen and 1024 × 768 resolution for an external monitor.

Need expansion capabilities? You can upgrade from the WinBook's standard 120MB hard drive to a 250MB drive, add a math coprocessor, or buy a docking station for desktop use; a 160-pin connector on the WinBook accommodates the docking station.

The WinBook has a good assortment of power-saving features which, according to the manufacturer, will extend battery life to a maximum of four hours. I found the machine to be faster and more responsive with all of the power-saving functions deactivated (this brought battery life down to about 1½–2¼ hours between charges).

While the WinBook as reviewed is a good value at \$1,699, if that's more than your wallet can handle, Micro Electronics is also offering a 25-MHz entry-level model of the WinBook, which has an



80MB hard drive and 2MB of RAM without the fax/modem for only \$1,499. In either version, the WinBook is an attractive machine, especially if you want to take your Windows applications on the road.

Circle Reader Service Number 375

NEC ULTRALITE VERSA 25C

This color notebook offers good looks and sizzling performance.

NEC offers the UltraLite Versa series of notebooks in several models: 20-MHz models are available with either color or monochrome displays, while the 25-MHz models are available with both monochrome and color displays and with and without pen capabilities. The review unit is a 25-MHz model based on the Intel 80486SL CPU and equipped with an active matrix TFT color LCD screen measuring 9.45 inches diagonally. A real treat for the eyes, it can display 256 colors at 640 × 480 resolution (800 × 600 resolution with 256 colors and 1024 × 768 resolution with 16 colors are supported via externally connected monitors).

One of the truly outstanding features of the UltraLite Versa 25C—its local-bus video—accounts for its blistering performance with graphics-related applications such as CAD and Video for Windows. This machine is no slouch when it comes to nongraphical chores such as database and word-processing work, either.

Ergonomic design and aesthetic appeal are obvious concerns,



and the UltraLite Versa 25C triumphs in both areas. NEC uses an attractive medium gray matte-finish plastic that hides fingerprints and resists scuffing well. A single slider control next to the screen adjusts the brightness of the color display. Rather than the usual array of LEDs commonly used for system status messaging, the UltraLite Versa 25C uses an LCD window which employs icons to convey system information. The

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 Boxborough, MA 01719
 (800) NEC-INFO (in USA)
 (800) 343-4418 (in Canada)
 (508)264-8000

Suggested retail price: \$3,869 with 80MB drive; \$4,269 with 120MB drive; \$4,539 with 180MB drive; \$2,659 with mono screen and 80MB drive

Warranty: three years, with free first-year upgrade to NEC Ultracare

usual items—including floppy and hard drive activity, power, power source, and battery condition—are all indicated, in addition to caps and numeric locks.

I liked the keyboard action and key placement, although I found the space bar to be considerably shorter than it is on other notebook keyboards, measuring 3.75 inch-

es. While this wasn't a problem for me, some users with big hands or wide thumbs may not find it to their liking. However, other features, such as a dedicated cursor keypad, an embedded numeric keypad, and 12 function keys more than make up for the short space bar. Of course, you can always plug a full-size keyboard into the dedicated socket provided for it at the rear of the machine.

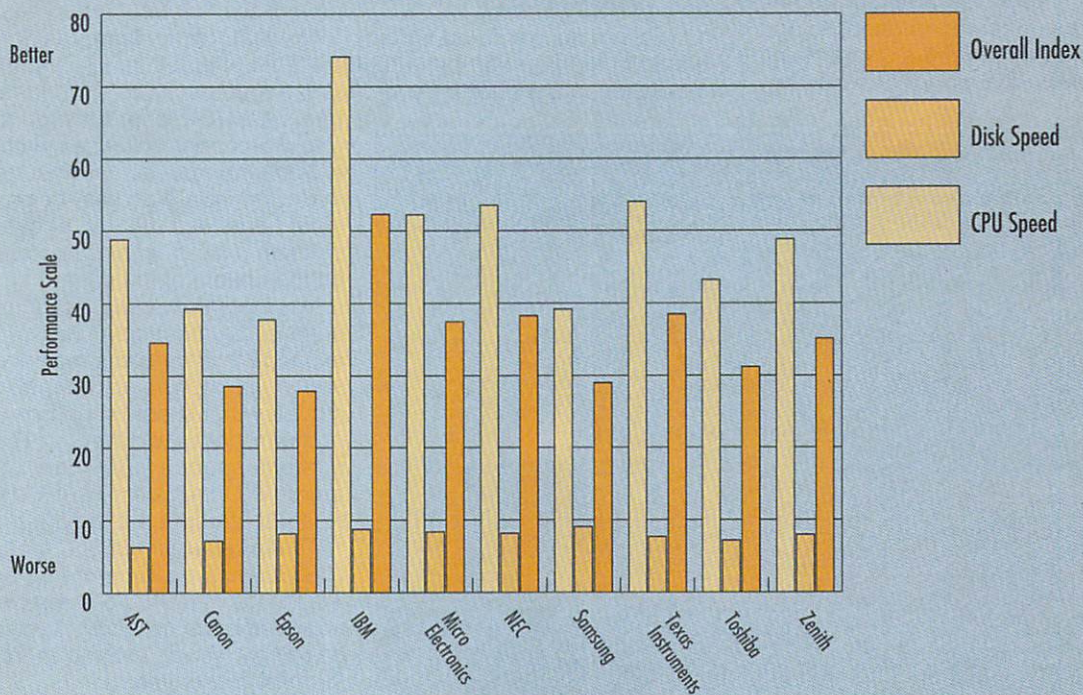
The package includes a Microsoft BallPoint mouse, which plugs directly into the dedicated mouse port (also at the rear). For adding options, the UltraLite Versa 25C also has one Type III PCMCIA slot, which can accommodate one Type III PCMCIA card or two Type II cards.

NEC has done a nice job of combining form and function in an attractive notebook with a superb color display.

Circle Reader Service Number 376

NORTON BENCHMARKS

The Norton Utilities 6.0 served as an overall "window" for viewing the systems' configurations, interrupts, and memory addresses. This group of utilities also provided a generic performance baseline, consisting of the CPU speed, the disk speed, and an overall index.



TEST LAB

SAMSUNG NOTEMASTER 486SLC

Samsung shows lots of ingenuity and some novel design concepts in its NoteMaster 486SLC Model S3800 notebook.

This trim notebook has tasteful styling and a dark, charcoal gray, nonglossy finish which hides fingerprints and light scuffs well. Lifting the lid of the unit reveals a ten-inch monochrome LCD capable of producing 64 levels of gray to produce 640 x 480 VGA resolution.

The NoteMaster has 256K of video RAM and allows you to run its display and an external SVGA monitor simultaneously. While the display is certainly large enough, it isn't one of the best monochrome screens I've seen. With the brightness and contrast adjusted for comfortable viewing, I could see several of the LCD's "pathways" (intersecting lines in the display's background), and uneven image density across the screen was also noticeable. The shortcomings of this display aren't serious enough for it to be con-

SAMSUNG ELECTRONICS AMERICA
Information Systems Division
105 Challenger Rd.
Ridgefield Park, NJ 07660-0510
(800) 446-0262

Suggested retail price: \$1,999 with 2MB RAM and 80MB drive (standard configuration); \$1,599 estimated street price); \$2,298 with extra 2MB RAM (review configuration); \$1,699 estimated street price)
Warranty: one year, parts and labor

sidered defective, but it did have a wearying effect on my eyes after only brief stints of looking at it.

The high-density floppy drive resides at the right side of the machine near the front, while the removable 2.5-inch hard drive resides just behind it, also on the right side. Yes, you read that correctly—the hard drive is removable on the NoteMaster, and that is its most unique feature. The advantages of a removable hard drive are many; for example, if you need additional storage, you can easily upgrade to a higher-capacity (120MB) drive.

Using Samsung's DriveMaster expansion kit, you can use the NoteMaster's hard drive on your



desktop PC to make data transfer between systems easy; you can keep your data secure by taking the drive with you when you leave the office, or multiple users of the same NoteMaster can have their own individual hard disks. There are plenty of other instances as well in which the removable drive would be a highly desirable feature.

Samsung provides 2MB of RAM and an 80MB hard drive as standard equipment on the NoteMaster. The review unit came equipped with 4MB of RAM as requested, and it also sported the optional 120MB hard drive.

The CPU for the NoteMaster is the Cyrix 486SLC running at 25 MHz. You can add an optional Intel 80387SX coprocessor to give the machine enhanced math-calculating power; Samsung makes the installation easy by providing access to a socket beneath a snap-off plastic cover on the bottom of the case.

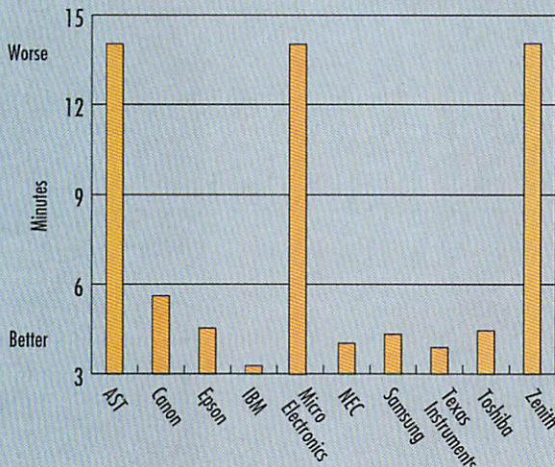
You can also easily install an optional fax/modem yourself. To expand the computer's memory, you'll use proprietary memory modules that simply snap into a compartment adjacent to the modem space. RAM can be expanded to a maximum of 8MB. No PCMCIA slots are provided.

The NoteMaster 486SLC Model S3800 is a good choice if you like the convenience of a removable hard drive, especially if you'll be using it with an external monitor most of the time.

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TI TRAVELMATE 4000 WINSX/25 COLOR

If you're interested in adding some color to your portable computing, backed by 486 processing power, then you may want to consider the TravelMate 4000 WinSX/25 Color notebook from Texas Instruments. This is the newest addition to TI's highly successful TravelMate 4000 series of 486 notebook computers.

The WinSX/25's 9.4-inch (diagonally measured) color LCD screen delivers 256 colors simultaneously at normal 640 x 480 VGA resolution and is supported with 512K of video RAM. You can plug in an external Super VGA monitor and find support for the following modes: 640 x 480 resolution with 256 colors, 800 x 600 with 256 colors, 1024 x 768 with 16 colors. Simultaneous display of both the LCD screen and a monitor is also possible.

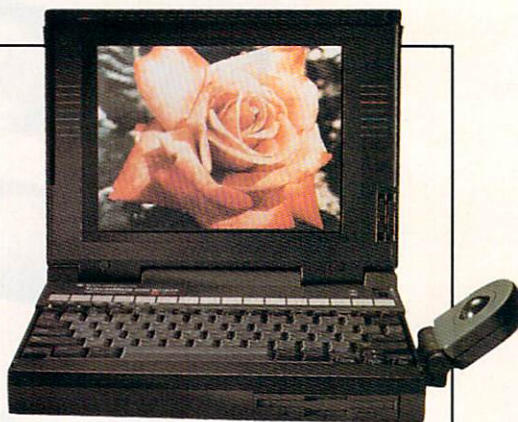
The WinSX/25's keyboard features a nice touch with moderately light action and nicely contoured key tops. Raised dots on the F and J keys help you find

TEXAS INSTRUMENTS
P.O. Box 202230
Austin, TX 78720-2230
(800) 527-3500

Suggested retail price: \$2,999
Warranty: one year, limited parts and labor

the home row, and there's an embedded numeric keypad and a separate inverted-T cursor control keypad. A color-coordinated Microsoft BallPoint mouse included with the WinSX/25 attaches to the QuickPort on the machine's right side.

Molded in two tones of gray, the WinSX/25 is a tastefully styled machine that does a good job of combining form and function. Dual slider controls for adjusting the color LCD's brightness and contrast come in handy, as some adjustment is frequently required when ambient light conditions change or when you switch from one application to another. I noticed some of the LCD's "pathways" visible in back of the video image when the brightness of the display was turned up all the way, and color saturation wasn't perfectly even across the full width of the



screen (these are characteristics of passive matrix color displays).

The standard configuration includes 4MB of RAM, which you can increase to a maximum of 20MB. A 120MB hard drive and a front-mounted 1.44MB floppy drive also come standard. One of the upgrade options, a 14,400-bps V.32bis modem with 9600-

NOTEBOOK PC TRAVEL KIT

Want to get the most out of your laptop or notebook? Today's portable computers are great, but if you're like most people who compute on the go, you need accessories. Luckily, MicroComputer Accessories has assembled a compact kit of ten essentials for laptop and notebook users.

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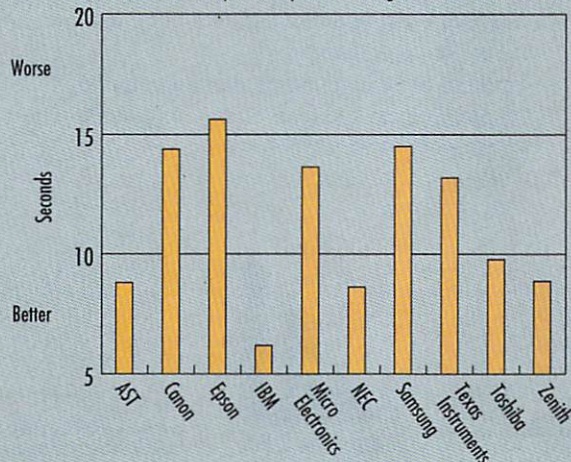
For more information, contact MicroComputer Accessories at 9920 La Cienega Boulevard, Inglewood, California 90308-7032, or call (800) 521-8270 or (310) 645-9400.

—PHILLIP MORGAN

Circle Reader Service Number 381

TEXT TEST

Using an 80-page Microsoft Word text document, the Text Test times how long it takes to search and replace a keyword occurring 1423 times in the document.



bps send-and-receive fax capability, plugs into an internal slot provided on all of the TravelMate notebook models.

A proprietary expansion bus built into the rear of the machine lets you connect additional external peripherals; when not in use, this bus is concealed from view by a snap-off panel door. All of the I/O connectors (serial, parallel, mouse, and external video ports) reside on the left side of the notebook beneath a drop-down panel.

The WinSX/25's Drop N' Go software utility is particularly useful, permitting accelerated access to your applications and thus saving both time and battery life. With all of TI's power-saving features enabled, battery life can exceed four hours, depending on the type of computing you're doing. Even with all of the power management features turned off, the machine regularly delivered average work times of two hours or more during my review before I had to recharge.

The CPU is a 486SX running at 25 MHz. DOS 5 and Windows 3.1 come preloaded on the WinSX/25, so you're ready to start doing useful work as soon as you turn the power on. Check it out.

Circle Reader Service Number 378

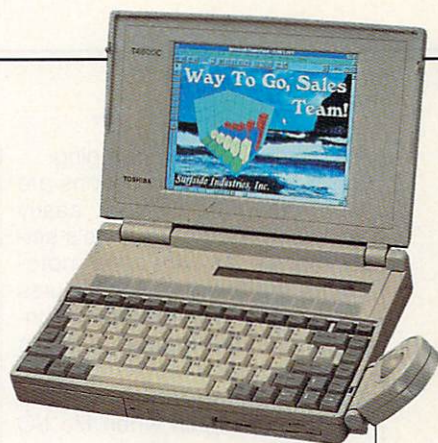
TOSHIBA AMERICA INFORMATION SYSTEMS
Computer Systems Division
9740 Irvine Blvd.
Irvine, CA 92718
(800) 334-3445
(714) 583-3000

Suggested retail price: \$3,799 with 120MB drive and color display

TOSHIBA T4500C

With its great assortment of desirable features, Toshiba's T4500C is another example of state-of-the-art technology in a 486-based color notebook computer.

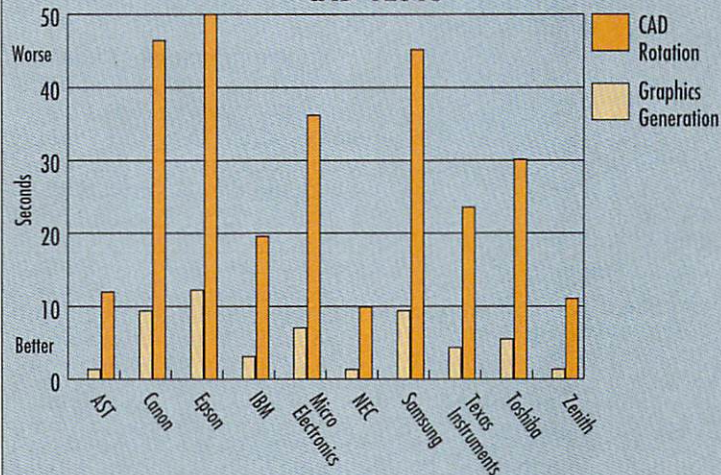
The T4500C provides a bright and colorful 8.5-inch TFT active matrix color display for working with Windows or DOS applications. Surprisingly, Toshiba provides no discrete controls for adjusting the brightness or contrast of the display. This didn't prove to be troublesome, however, as the display was sharp and easily visible even in bright light, requiring only a slight movement of the lid backward or forward to change the viewing angle for optimum visibility. The built-in display can provide VGA 640 x 480 resolution with 256 colors, while connecting an exter-



nal SVGA monitor enables the T4500C to produce 800 x 600 and 1024 x 768 resolutions.

Like manufacturers of some other top-of-the-line color notebooks covered here, Toshiba has forsaken the traditional LED status indicators in favor of an LCD window, which is separated into four "panes." In addition to providing information about hard and floppy disk activity, lock key status, and more, the window also provides a countdown clock, which gives you a realtime indication of how much operating time remains under current load conditions before the nickel-metal-hydride (NiMH) bat-

CAD TESTS



CAD TESTS

The Graphics Generation Test times the load of a complex color graphic file with thousands of unique elements, using AutoCAD's 3-D Concepts software. Since these elements must be calculated on the fly, this test is particularly indicative of the system's floating-point calculation capabilities and video speed.

The CAD Rotation Test times how long it takes to rotate and regenerate a CAD drawing with 57,657 elements in it. Since these operations are intensely numerical in nature, this test provides additional information about the system's ability to process floating-point calculations in realtime. This test was used in place of a spreadsheet calculation test, since all of these 486 notebooks were able to perform complex numerical spreadsheet calculations so quickly that performance differences were negligible.

—TOM BENFORD, PRESIDENT
 COMPUTER PRODUCT TESTING SERVICES

TEST LAB

tery pack requires recharging.

The power-saving options are well thought-out and easily accessed via the machine's set-up menus. As with other notebooks, the power-saving features cause some delays in the responsiveness of the T4500C, such as when the hard drive "goes to sleep" and takes a second or two to wake up again when file I/O operations are required.

A BallPoint mouse attaches via the machine's QuickPort. Although indeed a Microsoft BallPoint, it's molded in the same light, bone gray color as the T4500C and bears the Toshiba logo instead of the Microsoft name on its top (the underside identifies it as a Microsoft product, however).

Toshiba provides a single PCMCIA slot beneath a cover on the left side of the T4500C, and a similarly concealed cavity on the right side of the machine accepts a dedicated modem unit. The unit's 1.44MB floppy drive resides at the front of the machine toward the right side. All of the I/O ports (single serial, parallel, mouse, keyboard, and SVGA video) are hidden behind a drop-down door at the rear, and a pro-

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prietary connector for mating the T4500C with a desktop docking bay is concealed behind another panel next to the I/O bank.

The T4500C is a respectable performer with a terrific color display, a comfortable keyboard, great styling, and excellent expansion possibilities. It makes a great choice if you're looking for a color 486-based notebook.

Circle Reader Service Number 379

ZENITH Z-NOTE 425LNC

Its bone white case and bold, vertical lines accented by embossed-square designs around the case



perimeter make the Z-Note 425Lnc Model 200 a good-looker with lots of great features that become apparent when you open this notebook and turn it on.

Like other Z-Notes in the Zenith line, the 425Lnc has an LCD status panel which provides information about system status using icons rather than mere LEDs. The display takes the form of a four-pane LCD "window" in which graphical indicators signify the status of AC power operation, standby mode, battery power operation, hard drive activity, floppy drive activity, port replicator attachment, external CRT enablement, modem enablement, LAN controller enablement, and speaker enablement, as well as whether the Num Lock, Caps Lock, Pad Lock, and Scroll Lock keys are active. As you can see, this LCD window provides a wealth of information about which features are enabled or currently in use.

A single indicator, located in the center of the machine just below the display screen, shows power status with the lid closed; this LED changes color according to the current power/battery conditions.

The 425Lnc uses an Intel

KEYPADS YOU CAN COUNT ON

For all their power and convenience, notebooks can leave you frustrated when it comes to entering numeric data quickly and accurately. One solution is to attach a portable numeric keypad, such as those offered by Genovation and CNF.

The 17-key Micropad from Genovation is modeled after the numeric pad of the familiar enhanced AT keyboard. It attaches to your computer via a pass-through parallel interface, and there are serial- and keyboard-port versions as well. A five-foot cable is available with Micropad, and additional options include a form-fitting polyskin cover and 17 key tops with clear, removable lenses. The Micropad sells for about \$95.

The Numeric Keypads from CNF also feature 17 keys, and they have

a rated reliability of at least 10 million keystrokes between failures. These units plug into your PS/2 (mini DIN) port and include a two-foot cable, allowing them to be positioned on either the left or right side of most notebooks. The Numeric Keypads range in price from \$69 to \$99.

To receive more information about the Micropad, contact Genovation by calling (800) 822-4333 or by writing to 17741 Mitchell North, Irvine, California 92714.

Circle Reader Service Number 382

To receive more information about Numeric Keypads, contact CNF at 17705 Hale Avenue I-1, Morgan Hill, California 95037. CNF's phone number is (408) 778-1160.

Circle Reader Service Number 383

—LISA YOUNG

Benchmark/performance testing was conducted by Computer Product Testing Services Inc. CPTS is an independent testing and evaluation laboratory based in Manasquan, NJ. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.



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TEST LAB

486 Notebook Features

	AST PowerExec 4/25SL ColorPlus	Canon NoteJet 486	Epson ActionNote 4SLC/25	IBM ThinkPad 720C	Micro Electronics Winbook
Physical Characteristics					
Dimensions	1.98" x 11.5" x 8.5"	2.2" x 12.2" x 10"	1.6" x 11" x 8.7"	2.2" x 11.7" x 8.3"	1.75" x 11" x 8.75"
Weight + transformer	7.8 lbs.	7.7 lbs.	6.9 lbs.	7.6 lbs.	6.4 lbs.
Weight of extra battery	1.5 lbs.	1.3 lbs.	0.75 lb.	1.5 lbs.	0.9 lb.
System Electronics					
CPU manufacturer	Intel	TI	Cyrix or TI	IBM	Cyrix
CPU	25-MHz 486SL	25-MHz 486SLC	25-MHz 486SLC	50-MHz 486SLC2	33-MHz 486SLC/E
BIOS	AST	Phoenix	Seiko Epson	IBM	AMI
Cache	8K	1K	1K	16K	1K
Proprietary slot for modem	no	no	yes	NA	yes
Number of PCMCIA slots	2	2	0	2	1
Standard RAM	4MB	4MB	4MB	4MB	4MB
Max RAM	32MB	12MB	8MB	16MB	8MB
Display					
Type	active matrix color	monochrome	monochrome	active matrix color	monochrome
Illumination	backlit	backlit	backlit	backlit	backlit
Max res	640 x 480	640 x 480	640 x 480	640 x 480	640 x 480
Max colors	256	NA	NA	256	NA
Shades of gray	NA	16	64 or 32	NA	64
Diagonal screen size	9.5"	9.5"	10"	10.5"	approx. 10"
External monitor support	yes	yes	yes	yes	yes
Simultaneous display + external	yes	no	yes	yes	yes
Modular display	no	no	no	no	no
Drives					
Size of hard drive	200MB	135MB	120MB	165MB	128MB
Floppy drive placement	right side	left side	right side	front left	left side
Input/Output					
Parallel ports	1	1	1	1	1
Serial ports	1	1	2	1	1
External keyboard port	mouse/keyboard	mouse/keyboard	mouse/keyboard	no	mouse/keyboard
Mouse port	mouse/keyboard	mouse/keyboard	mouse/keyboard	yes	mouse/keyboard
Pointing device	integrated keyboard trackball	mouse/trackball	Logitech TrackMan	TrackPoint II	integrated Alps trackball
Expansion unit port	yes	yes	no	yes	yes
External drive port	no	no	parallel port doubles as ext. drive port	NA	NA
Power					
Battery type	nicad	nicad	nicad	NiMH	NiMH
Hardware power management	yes	NA	yes	yes	yes
Software power management	yes	yes	yes	yes	yes
Software					
In addition to standard DOS and Windows	AST Online user manual	NoteJet software	WinFax Lite, BitCom	Prodigy kit	BitCom and BitFax
NA=not applicable or information on this feature not available at press time					

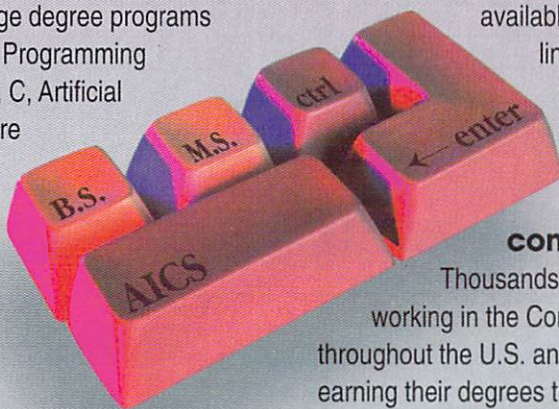
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486 Notebook Features

	NEC UltraLite Versa 25C	Samsung NoteMaster 486SLC	TI TravelMate 4000 WinSX/25 Color	Toshiba T4500C	Zenith Z-Note 425Lnc
Physical Characteristics					
Dimensions	2.09' x 11.69' x 9.33'	1.8' x 8.5' x 11'	2.1' x 11' x 8.5'	2' x 11.7' x 8.3'	2.1' x 11.9' x 8.5'
Weight + transformer	8.1 lbs.	5.9 lbs.	6.3 lbs.	6.9 lbs.	7.5 lbs.
Weight of extra battery	1 lb.	1.2 lbs.	1.35 lbs.	1.5 lbs.	1.18 lbs.
System Electronics					
CPU manufacturer	Intel	Cyrix	Intel	Intel	Intel
CPU	25-MHz 486SL	25-MHz 486SLC	25-MHz 486SX	25-MHz 486SX	25-MHz 486SL
BIOS	Phoenix	Phoenix	Phoenix	NA	ZDS
Cache	8K	1K	8K	8K	8K
Proprietary slot for modem	no	yes	no	no	yes
Number of PCMCIA slots	2 Type II or 1 Type III	0	0	1	0
Standard RAM	4MB	2MB	4MB	4MB	4MB
Max RAM	20MB	8MB	20MB	20MB	28MB
Display					
Type	active matrix color	monochrome	passive color STN	active matrix color	active matrix color
Illumination	sidelit	backlit	edgelit	NA	NA
Max res	640 x 480	640 x 480	640 x 480	640 x 480	640 x 480
Max colors	256	NA	256	256	256
Shades of gray	NA	64	NA	NA	NA
Diagonal screen size	9.5"	10"	9.4"	8.5"	8.4"
External monitor support	yes	yes	yes	yes	yes
Simultaneous display + external	yes	yes	yes	yes	yes
Modular display	yes	NA	no	no	yes
Drives					
Size of hard drive	179MB	120MB	120MB	120MB	200MB
Floppy drive placement	right side	right side	front right	front right	right side
Input/Output					
Parallel ports	1	1	1	1	1
Serial ports	1	1	1	1	1
External keyboard port	yes	mouse/keyboard	yes	yes	yes
Mouse port	yes	mouse/keyboard	yes	yes	yes
Pointing device	Microsoft BallPoint	internal mouse	Microsoft BallPoint	Microsoft BallPoint	Logitech TrackMan
Expansion unit port	yes (for docking station)	no	yes	yes	port replicator
External drive port	no	no	yes	yes	no
Power					
Battery type	NiMH	nicad	nicad	NiMH	NiMH
Hardware power management	yes	yes	yes	yes	yes
Software power management	yes	NA	yes	yes	yes
Software					
In addition to standard DOS and Windows	remote diagnostics	NA	TI utilities (Battery Pro, Large Cursor, Drop N' Go, power management)	Ultrafont, hypertext online documentation	Windows for Workgroups, Network Client Shells
NA=not applicable or information on this feature not available at press time					

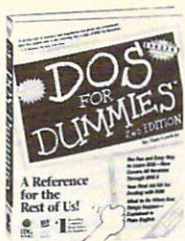
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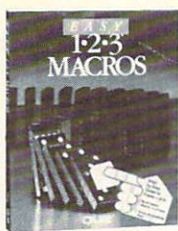
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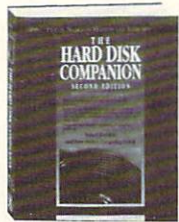
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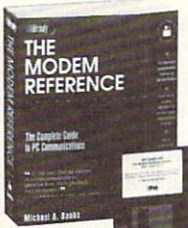
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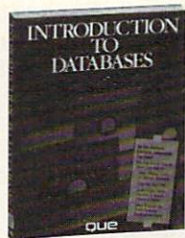
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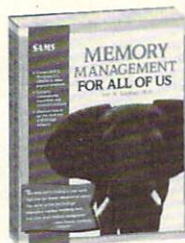
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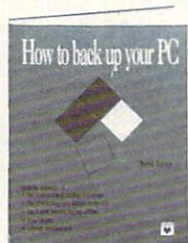
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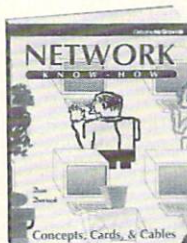
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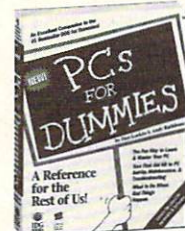
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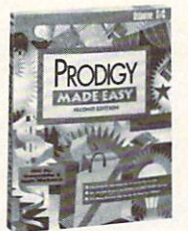
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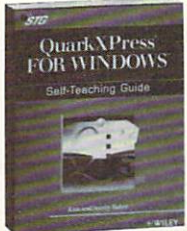
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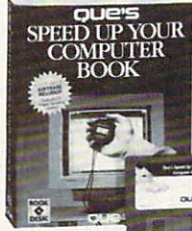
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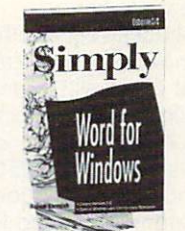
70565 \$19.95



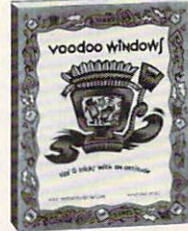
73125 \$22.95



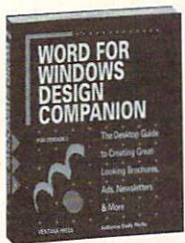
73243-2 \$29.95
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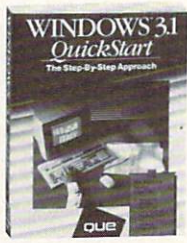
78360 \$14.00



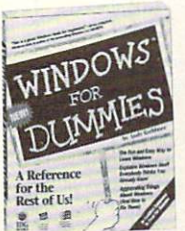
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TEST LAB

80486SL CPU running at 25 MHz as the source of its computing power and comes with 4MB of RAM as the standard complement; for those who need more oomph, the RAM can be expanded up to 28MB. No PCMCIA slots are provided on the 425Lnc.

A few words about the 425Lnc's comfortable keyboard are in order here, since it is one of the best keyboards I've come across on a notebook or laptop PC. The key tops themselves are gently contoured with softly rounded edges that fit the fingertips well. The action is firm, not "mushy," and fast touch-typists will find it a joy to use. The embedded numeric keypad and dedicated cursor direction keys complement the alphanumeric keys, and the F and J keys have raised dots on them for confirming home row position.

Data input doesn't end with the keyboard, however, and Zenith covered that end well by providing a Logitech TrackMan pointing device, which conveniently clips onto either side of the 425Lnc. The notebook also comes equipped with a dedicated PS/2 mouse port, which accepts the plug from the TrackMan's cable

to make using Windows and other GUI-based applications more efficient. The TrackMan's color perfectly matches that of the 425Lnc, and the turquoise-colored trackball "works" with the blue-green color of the Zenith logo on the notebook.

Color plays a big part in the 425Lnc, since it comes equipped with a TFT active matrix color display, which measures almost 8.5 inches diagonally. The display is clear and bright, providing 640 x 480 VGA resolution internally; if you plug an external SVGA monitor into the 425Lnc, you can use resolutions of 800 x 600 with 256 colors or 1024 x 768 with 16 colors. While not the largest color LCD I've seen, the 425Lnc's is certainly one of the best.

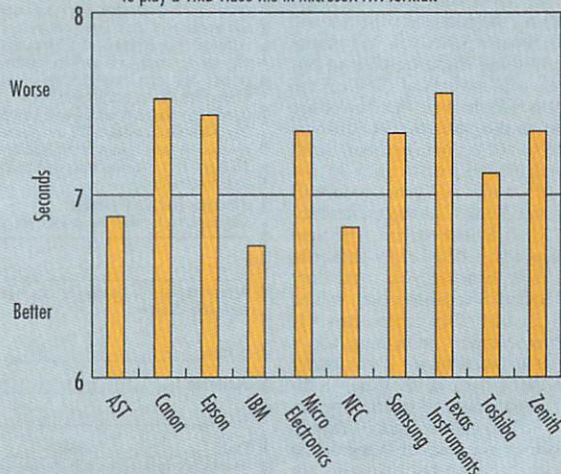
The Z-Note 425Lnc is a good choice for discriminating users who don't mind spending a bit more for a color notebook that performs well.

Circle Reader Service Number 380

For coverage of another 486 notebook, The Gateway 2000 Nomad 450DXL, see the review section.

VIDEO FOR WINDOWS

Our Video for Windows Test records the elapsed time required to play a 1MB video file in Microsoft AVI format.



SPEAK UP!

Is there a group of hardware or software products you'd like to see covered in an upcoming Test Lab? Let us know by calling (900) 884-8681, extension 7010102 (sponsored by Pure Entertainment, P.O. Box 186, Hollywood, California 90078). The call will cost 95 cents per minute, you must be 18 or older, and you must use a touch-tone phone.

A NOTE ON PRICES

With computer products changing more rapidly than ever and with options more plentiful than ever, computer prices can be a tricky business, indeed.

It pays to keep the following points in mind:

Street and direct prices can be considerably lower than list prices. Shopping around helps you find the best price.

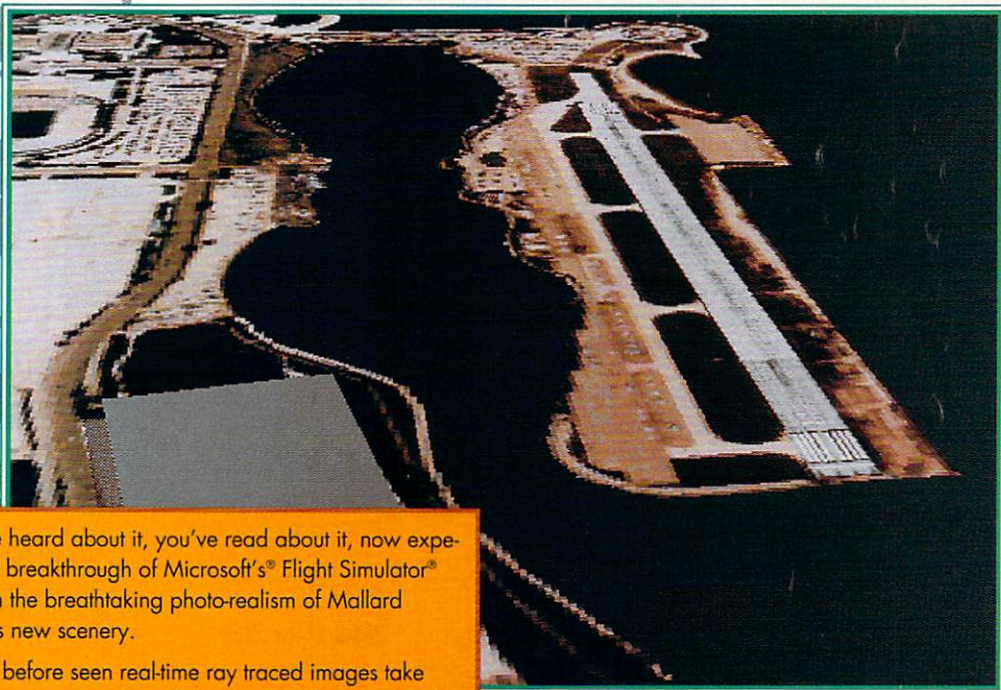
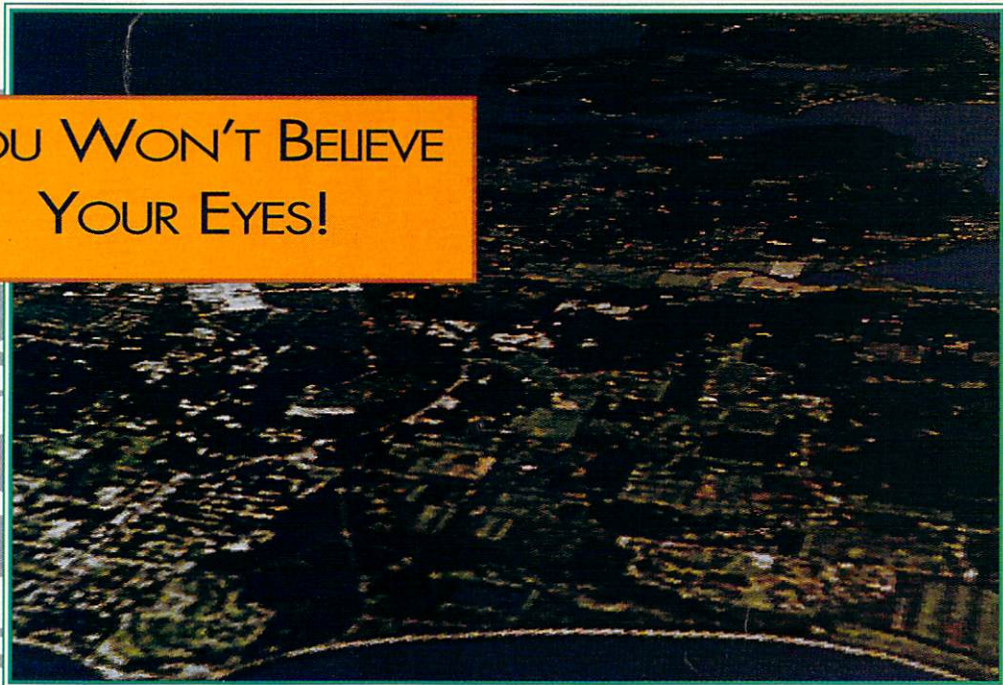
Because computer technology evolves rapidly, a product may have changed by the time our review sees print. A manufacturer may decide to change the software or the hard drive, for example.

Because consumers are more sophisticated than ever about what they want in computer products and because manufacturers have responded with more options and configurations than ever, one computer model may be subject to dozens of variations, each with a slightly different price.

At COMPUTE, we make every effort to verify prices and differentiate between the price for a review configuration and the price for a standard configuration. It's still a good idea, however, to call the manufacturer or vendor to make sure that the configuration you want matches the price you have in mind.

—MIKE HUDNALL

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NEWS & NOTES

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No More Blandscapes

No more staring at a *boring* monitor, now that Screenies have arrived. These illustrated frames for your screen, bursting with color, will rescue you from "the visual monotony" of your putty-colored monitor and "individualize your workspace at home and at the office," says Screenies inventor Rusty Schwartz, who also owns an art gallery in Sonoma, California.

Choosing from the 51 Screenies in the introductory First Edition Collection, for which many of America's top illustrators were commissioned, you can frame your monitor with a space station, inquisitive news media, mischievous kitties at the cat box, children at school, a rain forest, even Ren & Stimpy—and much more.

Functional Screenies include a corkboard for posting notes, a dry-erase memo board, and a photo-frame collection. A line of holiday Screenies is currently in production. Each design is mounted on sturdy yet flexible art board, varnished for protection, and packaged in a resealable vinyl envelope. At \$11.95 each, the Velcro-afixed frames are infinitely interchangeable.

Look for this new trend in "computerwear" at computer supply stores and gift and stationery shops across the U.S. For more information, contact Screenies, 18971 Sonoma Highway, Sonoma, California 95476; (707) 939-6060, (707) 939-6065 (fax).

Double Protection

Notebooks and laptops don't have to take a beating during travel. Colorado-based Doublecase manufactures a line of Eurodesigned attaché-style cases that offer extra protection for your delicate equipment. What's special about

the Doublecase line is that each piece is engineered as a case within a case, with a double wall of tough, high-impact polyethylene that traps a cushion of air for extra protection from impact. The most versatile Doublecases are models NB-3600 and NB-4600, which allow you to easily customize your case interior by removing small cubes of foam. And these two are big enough to hold 17- x 11-inch notebook computers plus accessories. The NB-4600 does double duty as a briefcase, with extra compartments for



files, pens, and cards. Doublecase prices range from \$60 to \$200. For more information, contact Doublecase, 5350 North Academy Boulevard, Colorado Springs, Colorado 80918; (800) 475-0707, (719) 594-9331 (fax).

Now Hear This

Wouldn't it be nice to *tell* your computer what to do? Voice Blaster from COVOX lets you do just that by adding powerful voice recognition capabilities to popular sound cards and keystroke-intensive applications. This is an easy-to-use, entry-level product rather than an expensive, high-end technology that's difficult to learn and implement. It's designed to increase your personal productivity by adding a voice command interface that can be tied to keyboard and mouse macros.

Corporate PC users, hobby-

ists, PC game players, and program developers all can add voice commands to more than 1000 DOS and Windows business, educational, and entertainment software titles, including dBASE, Fox-Pro, Quattro Pro, Quicken, WordPerfect 5.1, and AutoCAD as well as games from Electronic Arts, GameTek, LucasArts Entertainment, MicroProse, Sir-Tech, and Villa Crespo. The system includes a high-fidelity headset (with a microphone and speaker) that connects to your computer via the parallel port. Voice Blaster also works with a variety of existing PC microphone systems and improves recording capabilities on most popular sound boards. It requires a Sound Blaster-compatible sound board. Suggested retail price is \$119.95.

If you would like to know more, contact COVOX, 675 Conger Street, Eugene, Oregon 97402; (503) 342-1271, (503) 342-1283 (fax).

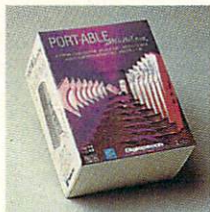
Hot Chip, Cool Solution

If your machine uses one of the new Intel Pentium chips, you could have a hot problem on your hands. The elevated temperature of an uncontrolled Pentium can cause system halts, UAEs in Windows, hard drive data corruption, and total loss of data.

PCubid's Pentium CPU Kooler, installed on the Pentium chip, provides an environment fully compliant with Intel's specifications for thermal control. Incorporating a custom-machined heat sink and a miniature fan, the CPU Kooler includes a temperature-probe port that allows you to add Radio Shack's Micronta digital thermometer as an optional accessory for measuring the heat sink temperature to ensure that the Pentium is being adequately cooled. With or without the tempera-

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Jurassic Art

Take a walk through *this* Jurassic park—er, art—and you'll see velociraptors dancing, not the vicious killers that run loose in Michael Crichton's bestseller. Arts & Letters Jurassic ART, a complete drawing program from Computer Support, incorporates the company's new Flex-Art technology, which allows you to actually customize its hundreds of colorful, detailed clip art images of dinosaurs. The program also includes an exceptionally well illustrated informational booklet, *The Age of Dinosaurs*, and an online database that provides instant access to dinosaur facts, charts, paleontological terms, and maps showing (by state) where dinosaur tracks, quarries, and exhibits can be found.

What's more, when you purchase Arts & Letters Jurassic ART, a portion of the sales will be contributed to "Quest for the African Dinosaur," sponsored by the Institute for the Study of Earth and Man (ISEM). ISEM is raising funds to bring the fossilized skeleton of a new type of dinosaur from Malawi, in Africa, to the United States, where it will be reassembled and a model of it made.

Once *Malawisaurus* comes to life in model form, the orig-

inal skeleton will be returned to the citizens of Malawi and supervised by Malawian paleontologists trained under the ISEM program.

Arts & Letters Jurassic ART retails for \$59.95. If you would like more information, contact Computer Support, 15926 Midway Road, Dallas, Texas 75244; (214) 661-8960, (214) 661-5429 (fax).

It Can Be Done

Can the federal budget be balanced? Congress says no, but consumers say yes. Banner Blue released its Uncle Sam's Budget Balancer software last fall, offering it free to all consumers as a public service to help increase American taxpayers' awareness of the budget crisis. Banner Blue says the response was outstanding. Results from the company's customer survey show that while many of those who used the program are pessimistic about the government's current solutions to the budget problem, 52 percent of those who tried the program have already balanced the budget themselves. For those who want to tackle fiscal year 1994, Banner Blue is offering an upgraded version of Budget Balancer for \$19.99 plus \$4.00 shipping (39500 Stevenson Place, Suite 204, Fremont, California 94539; 510-794-6850, 510-794-9152 [fax]).

One response from a Brooklyn Park, Minnesota, customer summed up the feeling for most users—and probably most frustrated American taxpayers: "The program allowed me to see that a workable solution to the budget problem is possible . . . so why can't the government come up with a solution?"

Capture It All

Screen shots don't have to be a hassle. Collage Complete,

the easy new screen-capture program from Inner Media, is a complete image-handling system for both DOS and Windows that captures, converts, and catalogs images *fast*. Capture all or a cropped portion of a screen—with or without the cursor—in one of numerous formats supported, including PCX, TIF, GIF, Targa, BMP, and JPEG, in color, black-and-white, and dithered or true gray. The program's unique "countdown" timer allows you to make your picture just right, and with Preview mode, you're sure to save the right screen the first time around.

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Companies or public relations firms with items suitable for "News & Notes" should send information along with a color slide or transparency to News & Notes, Attention: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

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FEEDBACK

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sorts you can
count on, ports you
can find, mice
you can program, and
applications you
can run once a day

Save That Screen

I want to save a screen created with a BASIC program in a format that I can do something with.

JIM BROWN
ATLANTA, GA

Here's a routine written in QBASIC that saves whatever's on the screen as a BMP file, the kind of file you could use as a Windows wallpaper file or load into Windows Paintbrush (or any program that can load a BMP file) to edit.

```
SCREEN 12
DIM b(1345), a%(16)
FOR i = 0 TO 15
a%(i) = INT(RND * 64) + INT(RND
* 64) * 256 + INT(RND * 64) *
65536
NEXT
PALETTE USING a%(0)
cur=0
REM Place draw routine here.
REM The following lines are
REM a dummy drawing routine
REM just to put something on
REM the screen.
FOR i = 0 TO 639
LINE (i, 0)-(i, 480), i AND 15
NEXT
GOSUB SAVESCREEN
END
```

```
SAVESCREEN:
GET (0, 0)-(200, 16), b
LINE (0, 0)-(200, 16), 0, BF
LOCATE 1, 1
c% = a%(cur + 15)
b% = a%(cur)
a%(cur) = 63 + 256 * 63 + 65536 *
63
a%(cur + 15) = 63
PALETTE USING a%(cur)
INPUT "Filename: ", FILE$
a%(cur + 15) = c%
a%(cur) = 0
PALETTE USING a%(cur)
PUT (0, 0), b, PSET
IF FILE$="" THEN RETURN
OPEN FILE$ FOR OUTPUT AS #1
RESTORE bmpdata
FOR i = 0 TO 53
READ a: PRINT #1, CHR$(a);
NEXT
FOR i = 0 TO 15
```

```
PRINT #1, CHR$(((a%(cur + i) AND
65536 * 63) / 65536) * 4);
PRINT #1, CHR$(((a%(cur + i) AND
256 * 63) / 256) * 4);
PRINT #1, CHR$(a%(cur + i) AND
63) * 4);
PRINT #1, CHR$(0);
NEXT
point$ = ""
GET (0, 0)-(10, 479), b
FOR i = 479 TO 0 STEP -1
c = (c + 1) AND 15
LINE (0, 481)-(9, i + 1), c, BF
FOR j = 0 TO 639 STEP 2
point$ = point$ + CHR$(POINT(j, i)
* 16 + POINT(j + 1, i))
NEXT
PRINT #1, point$; : point$ = ""
NEXT
CLOSE
PUT (0, 0), b, PSET
a%(cur) = b%
RETURN
```

```
bmpdata:
DATA 66, 77, 118, 88, 2, 0, 0, 0
DATA 0, 0, 118, 0, 0, 0, 40, 0
DATA 0, 0, 128, 2, 0, 0, 224, 1, 0
DATA 0, 1, 0, 4, 0, 0, 0, 0, 0
DATA 88, 2, 0, 132, 61, 0, 0, 132
DATA 61, 0, 0, 0, 0, 0, 0, 0, 0
DATA 0, 0, 0, 0
```

Sort of a Problem

I want to sort a file, but not based on the first character in each line. Can you show me a BASIC program that will accomplish this?

CHAR THEUNE
GROSSE POINTE FARMS, MI

A BASIC program would be easy enough to write, but why not just use the MS-DOS command SORT? Usually, SORT is used to arrange files in alphanumeric order according to the first character in each line, but this command is far more flexible than that. To sort based on the second character in a line, use the command SORT /+2. To sort in reverse order, use SORT /R.

The newer versions of DOS have help built in. To see all the things that SORT can do, type sort /?.

BASIC Appreciation

I would like to express my thanks to your publication for including BASIC in its monthly coverage of the computer world.

I understand that some say that BASIC is a less-than-useful language, but, speaking as someone who uses it regularly and is constantly studying it, I am glad that not all feel this way.

I hope that you will continue to cover all of the computer world as well and completely as you have in the past. As a reader, I never stop learning from your publication.

DIRK R. LAUBER
DELTA, OH

Remove

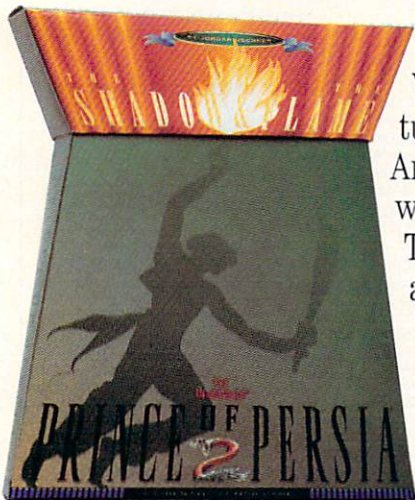
My language of choice is BASIC. I decided to make a menu program for running all my other programs. Everything works fine, but it's keyboard-driven, and I'd like to make use of the mouse in QBASIC. Is there any way to do this?

MARIUS ZDYK
CALGARY, AB

Probably not in QBASIC, but a routine for accepting mouse input into QuickBASIC ran in "Tips & Tools" in April 1992. Here's a shorter program for getting mouse data. You have to run QuickBASIC with the library QB.QLB. To do this, start up QuickBASIC with the command QB /L QB.QLB.

```
REM Original program by
REM Mike Konesky of
REM Pittsburgh, Pennsylvania
' $INCLUDE: 'qb.bi'
DECLARE SUB hide ()
DECLARE SUB show ()
DECLARE SUB getm (k%, x%, y%)
DIM SHARED Inregs AS RegType,
Outregs AS RegType
DO
getm k%, x%, y%
LOCATE 1, 1
```

Bad Day in Bagdad!



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Circle Reader Service Number 245

FEEDBACK

```
PRINT x%, y%, k%, "Press both
mouse buttons to end program."
LOOP WHILE k% <> 3
hide
END
```

```
SUB getm (k%, x%, y%)
Inregs.ax% = 3
CALL INTERRUPT(&H33, Inregs,
Outregs)
x% = Outregs.cx% / 8 + 1
y% = Outregs.dx% / 8 + 1
k% = Outregs.bx%
END SUB
```

```
SUB hide
Inregs.ax% = 2
CALL INTERRUPT(&H33, Inregs,
Outregs)
END SUB
```

```
SUB show
Inregs.ax% = 1
CALL INTERRUPT(&H33, Inregs,
Outregs)
END SUB
```

An Ez in Every Port

In the May Test Lab on tape drives, product information for the Irwin EzPort was accidentally left out. The 250MB EzPort lists for \$548, and a 120MB version is available for \$448. For more information, contact Maynard Electronics, a division of Conner Peripherals, at (800) 222-5871. Maynard offers a one-year warranty on the EzPort.

In the July issue, the article on BIOSs is accompanied by the sidebar "Flash BIOS," which contains the statement that updating a flash BIOS can only be accomplished with specialized equipment. That is incorrect. A flash BIOS can be upgraded by the user, assisted by a utility that can be downloaded from the computer manufacturer's BBS.

THE EDITORS

Better 1DAY

Here's a better solution to the problem of running a program only once a day. It's better because it doesn't use BASIC, so it accomplishes in about 3000 bytes what your solution ("Feedback," April 1993) took 80K to do. There are three batch files. The first is called 1DAY.BAT.

```
@ECHO OFF
ECHO |MORE |DATE > !@#.BAT
CALL !@#
IF NOT EXIST !#!.BAT GOTO DOIT
CALL !#!
IF %LASTDATE%==%TODAY%
GOTO END
:DOIT
ECHO !!! %TODAY% > !#!.BAT
REM This is where you should
REM put the commands to
REM run the programs you
REM only want to run once
REM a day.
ECHO.
:END
SET TODAY=
SET LASTDATE=
```

The second batch file is called CUR-RENT.BAT.

```
SET TODAY=%4
```

The third batch file is called !!!.BAT.

```
SET LASTDATE=%1
```

You have to have More and each of these batch files in your path for the program to work. Any programs you list where the REM statements appear in 1DAY.BAT will run only once a day.

R. C. MARCUS
ST. THOMAS, ON

Thank you for your elegant solution.

Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Call our special "Feedback" line: (900) 884-8681, extension 7010201 (sponsored by Pure Entertainment, P.O. Box 186, Hollywood, California 90078). The call will cost 95 cents per minute, you must be 18 or older, and you must use a touch-tone phone. Or write to "Feedback" in care of this magazine. Readers whose letters or calls appear in "Feedback" will receive a free COMPUTE baseball cap while supplies last. We regret that we cannot provide personal replies to technical questions. □

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ELECTRONIC ARTS®



WINDOWS WORKSHOP

Clifton Karnes

Last month, I promised to talk about DOS 6's DoubleSpace, especially as it compares to Stac Electronics' Stacker. I've been using Stacker since version 1.0, and it's always performed flawlessly. I have to admit that I was a little queasy about trying a new compression product, but I wanted to test DoubleSpace and compare it with Stacker, so I decided to give it a try.

For Stacker users, Microsoft has a \$10 product that will convert a Stacker-compressed volume to a Dou-

6 bootable floppy and reformatted my hard disk with the /s option to make the disk bootable.

Before I could install DoubleSpace, I needed to restore all the files I use that create virtual drives, because these need to be active when DoubleSpace runs so it can intelligently choose a drive letter for itself. This meant that I had to reinstall my network files so the network drives would be available. I had to run Windows and build a permanent swap file, because after DoubleSpace was installed, this would not be possible. And I had to restore all my CD-ROM software so the CD-ROM drives could be installed.

After these files were restored, I booted up DOS (with its CD-ROM drives) and logged on to the network. Next, I ran DoubleSpace and followed the onscreen instructions to build a compressed volume. DoubleSpace works like Stacker in that it creates a compressed drive that in reality is a hidden system file on your physical drive. After the DoubleSpace (or Stacker) driver is installed, this file looks just like another drive to your computer. Traditionally, the real drive is called the physical drive, and the compressed drive is called the logical drive. This logical drive is, as mentioned above, really just a large file on your physical drive. After DoubleSpace installed itself, my drive C was a logical drive, and my physical drive became drive E.

Next, I restored the rest of my files (this took about four hours), and I was ready to go. I wanted to run my benchmarks using DoubleSpace, but just to be on the safe side, I optimized the DoubleSpace volume first and then ran the programs.

The results were about

what I'd expected. DoubleSpace proved to be essentially as fast as Stacker (Stacker averaged 2 percent faster, which I consider insignificant), and it provided about the same compression ratio—1.8 to 1.

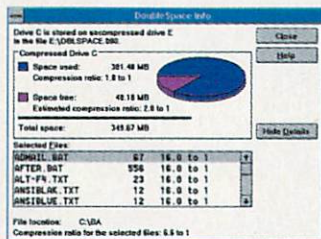
I have been running DoubleSpace for about two months, and it's performed without a hitch.

For Windows users, DoubleSpace does two things. First, it gives you more disk space for disk-hungry Windows applications. Second, it lets you check on your free disk space and the compression ratio for any file or group of files from inside File Manager. If you click on the DoubleSpace icon or select Tools, DoubleSpace Info, you'll see a 3-D pie chart of your hard disk indicating free space. Click on More, and you'll see the compression ratio of the selected file or files. Pretty cool.

DoubleSpace has one big advantage over Stacker that I haven't discussed so far, and that's that the driver is loaded before your system runs CONFIG.SYS. This means that with DoubleSpace there's no more problem synchronizing CONFIG.SYS and AUTOEXEC.BAT files on both your logical and physical volumes (usually drives C and D, respectively). The next version of Stacker should incorporate this enhancement, too.

So what do you do about DoubleSpace? If you're already using Stacker, there's little reason to switch, especially since it will cost you \$10 if you use the conversion program. If you have DOS 6 and haven't installed a compression program yet, go ahead and install DoubleSpace, and reinstall a couple of those big applications you've had to knock off your hard disk in the last year. □

With DoubleSpace, you can check on your free disk space and the compression ratio for any file or group of files from inside File Manager.



bleSpace one (there's a coupon in your DOS manual). I had hoped to use that product to convert my Stacker drive to a DoubleSpace drive, but it didn't arrive in time, so I did the conversion the hard way.

Here's the procedure I followed: I backed up my hard disk to tape, reformatted the disk, installed DoubleSpace, and restored the tape backup. It was not quite as simple as this sounds, but that's the gist of it. Since I wanted to run some benchmarks on my Stacker volume before I reformatted, I first optimized the Stacker drive and ran my database benchmarks and a suite of Windows programs. I ran each benchmark three times and averaged the scores.

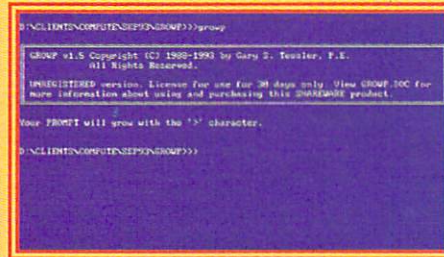
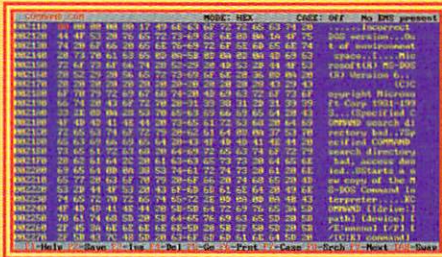
Next, I backed up my hard disk. With Stacker, my hard drive is about 400MB, and the backup took about two hours. Then I created a DOS

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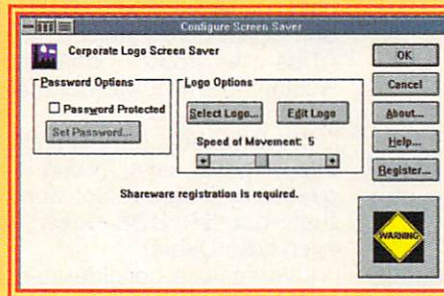
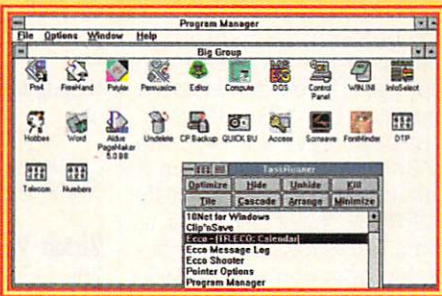


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TIPS & TOOLS

Edited by Richard C. Leinecker

Finding a Debug alternative and skipping the perforations

Easier Debug

I've had a number of requests for instructions on how to create those Debug scripts we publish. If you know a little assembly language, it's not too hard. Just write a small program that does something useful; then convert it to a text file that we can publish. Check out previous issues to see what the format looks like. Some of you have done just that, and we appreciate it very much. The "Tips & Tools" column wouldn't be much without the readers' input.

Other readers have written in saying that using Debug is awkward. I agree. Not only that, but DR DOS doesn't even have Debug.

I've spent a considerable amount of time addressing both of these issues. I wrote a program that does two things. It makes typing in those Debug scripts easier and even gives you an automatic checksum amount. It'll also give you the tools you need to create the scripts from your own programs. Besides that, I've collected a bunch of old programs for examples. The last thing I put together was a text file explaining the entire process.

The program, under the name TIP_TOOL.ZIP is available on GENie, CompuServe, and America Online.

RICHARD C. LEINECKER
REIDSVILLE, NC

Skip the Perfs

The rather long BASIC program in answer to Abigail Furth's question published in "Feedback" in March 1993 seems to be overkill. All she wanted to know was how to skip the perforations while copying a file to PRN. A simple one-line program will do the trick.

Many 9-pin printers emulate the Epson FX line of print-

ers. These printers all skip the perforations when sent the three-byte command sequence Esc-N-#. The # stands for the number of lines to skip over. I like 8, so the printer sequence I send is Esc-N-8. You can use the following BASIC program to do this.

```
LPRINT CHR$(27) + "N"  
+ CHR$(8)
```

The program can be compiled and put somewhere in your path. If you don't have a compiler but QBASIC is in your path, save the program as SKIPPERF.BAS and run it with the line QBASIC /RUN SKIPPERF. You'll also need to add a line to the program containing the command SYSTEM, which returns you to the system. Here's the program if you plan to use this approach.

```
LPRINT CHR$(27) + "N"  
+ CHR$(8)  
SYSTEM
```

If you don't want to use BASIC, you can create a special file and send it to the printer. You'll have to use Debug to create a three-byte binary file. Type the following. In these examples, the italic text is what the computer prints; the roman text is what you should type.

```
debug skipperf.dat  
File not found  
-e 100 1B 4E 08  
RCX  
CX 0000  
:3  
-W  
Writing 0003 bytes  
-Q
```

To make your printer skip the perforations, type (or put in a batch file) *copy skipperf.dat prn*.

You can reset your printer

to its default settings with the following BASIC program.

```
LPRINT CHR$(27) + "@"
```

Or you can use the file created with the following Debug script.

```
debug restprnt.dat  
File not found  
-e 100 1B 40  
RCX  
CX 0000  
:2  
-W  
Writing 0002 bytes  
-Q
```

E. STUART JOHNSON
ATHENS, AL

Batch Version of Deletex

The DELETEx.COM program which was printed in the January 1993 issue of COMPUTE inspired this batch file, ERASENOT.BAT. Much like Richard C. Leinecker's creation, this batch file erases everything in the current directory except the files you specify. The advantage over DELETEx.COM is that it's easier to type it in and make changes. The disadvantage is that it's kind of slow.

```
ECHO OFF  
IF "%1" == "" GOTO USAGE
```

```
REM Here, we create a temporary  
REM directory to hold all of  
REM the files in this directory  
REM that we don't want to delete.  
REM If this directory name  
REM conflicts with anything in  
REM your system, use another  
REM name that doesn't.  
MD \TEMP  
:DOCOPY  
COPY %1 \TEMP
```

```
REM We do a shift so that up  
REM to nine arguments can be  
REM used.  
SHIFT  
IF "%1" == "" GOTO DONE  
GOTO DOCOPY
```

```
:DONE
REM First, we delete everything
REM in the current directory.
ECHO Y | DEL *.*
```

```
REM Then, we copy our temporary
REM files back here.
COPY \TEMP*.*
```

```
REM Now, we delete the files in
REM the temporary directory.
ECHO Y | DEL \TEMP*.*
```

```
REM And last, we remove the
REM temporary directory.
RD \TEMP
GOTO END
```

```
:USAGE
ECHO Usage: ERASENOT file-
mask1 filemask2 . . . filemask9
ECHO This batch file erases all but
the given file masks.
```

```
:END
ILYA TROYCHANSKY
BROOKLYN, NY
```

Files That Read Themselves

It never fails. I compress collections of files and send them to people, and they call back asking questions. To solve this problem, I include README files. Then they call and ask how to read the README files.

There are lots of other examples where groups of files need some explanation. You might be distributing disks to clients with records, programs, or batch files. Or you might upload files to an online service or BBS.

I have a solution that lets you create a program called MAKEREAD.COM. To use it, just create a file called README.TXT in the current directory and then run MAKEREAD.COM. It'll create a file called README.COM that displays a text file and allows users to cursor up and down through it. Press Esc to quit.

You can type Makeread in using the DOS Debug command (or with Com2hex, part

of TIP_TOOL.ZIP, which is available for download on many online services). Make sure the DOS program called Debug is in your path or the current directory. In these examples, the italic text is what the computer prints; the roman text is what you should type. One way to be sure you get these programs exactly right is to have someone read the numbers to you. Another way is to read the numbers into a tape recorder and then play them back as you enter the program code. This program will only work with color monitors.

```
debug makeread.com
File not found
-e 100 BA CE 01 B8 00 3D CD 21
-e 108 72 43 8B F8 BA C3 01 2B
-e 110 C9 B4 3C CD 21 72 36 8B
-e 118 D8 BA 51 01 B9 72 00 B4
-e 120 40 CD 21 B9 01 00 87 FB
-e 128 B4 3F CD 21 0B C0 74 08
-e 130 87 FB B4 40 CD 21 EB EE
-e 138 87 DF C6 06 51 01 1A B4
-e 140 40 CD 21 B4 3E CD 21 8B
-e 148 DF B4 3E CD 21 B4 4C CD
-e 150 21 B8 00 B8 8E C0 B4 01
-e 158 B9 09 69 CD 10 2B C9 2B
-e 160 FF B8 20 1F 51 B9 D0 07
-e 168 F3 AB 59 BE 72 01 2B DB
-e 170 2B ED 2B D2 8B FD AC 3C
-e 178 1A 74 1E 3C 0D 74 07 3B
-e 180 CB 7F F3 AB EB F0 3B CB
-e 188 7F 04 81 C5 A0 00 43 46
-e 190 8B D3 2B D1 80 FA 19 75
-e 198 DB 2A E4 CD 16 3C 1B 74
-e 1a0 19 80 FC 50 75 08 80 FA
-e 1a8 19 7C EE 41 EB B1 80 FC
-e 1b0 48 75 E6 0B C9 74 E2 49
-e 1b8 EB A5 B8 03 00 CD 10 B4
-e 1c0 4C CD 21 52 45 41 44 4D
-e 1c8 45 2E 43 4F 4D 00 52 45
-e 1d0 41 44 4D 45 2E 54 58 54
-e 1d8 00
-RCX
CX 0000
:00D9
-W
Writing 00D9 bytes
-Q
```

The checksum value (see the July 1993 "Tips & Tools" for

the new Checksum program) is 25423.

RICHARD C. LEINECKER
REIDSVILLE, NC

Viewing ZIPs in Windows

I use archives to compress files to floppy disks. From DOS it's easy to see what's in the compressed file; you just type *pkzip -vn zipfile l more*. From Windows it's harder; normally, I shell to DOS because it's easier than using the File Manager to run the program.

I solved the problem by creating a batch file called ZIP.BAT.

```
PKUNZIP -VN %1 | MORE
PAUSE
```

While in the Windows File Manager, highlight a ZIP file. From the File menu select Associate. Then choose the Browse button to select ZIP.BAT from the directory where it exists. Now, to view ZIP files, just double-click on those files.

STEVEN R. PETERS
BETHLEHEM, PA

Correction

In the October 1992 "Tips & Tools," a tip was published with the name *Andeep Tamhankar*. The name that appeared should have been *Sandeep Tamhankar*. Our apologies for the mistake.

RICHARD C. LEINECKER
REIDSVILLE, NC

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's Tips & Tools, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you \$25-\$50. All tips submitted become the property of General Media International. □

**Creating self-typing
README files
and peeking through
Windows to
see what's inside
ZIP files**

INTRODOS

Tony Roberts

MOVE AND DELTREE

They've been a long time coming, but Microsoft's new DOS has a couple of important disk-management tools—Move and Deltree—that shouldn't be overlooked.

Unless you already have some kind of a file mover on your system, getting a file from one place to another is a three-step process: First, you copy the file to its new location; second, you check to see that the copy was successful; and third, you delete the file from its original location.

With DOS 6, you can accomplish the move in a single command. The syntax is Move filename destination.

To move more than one file, you can use wildcards, as in Move *.TXT C:\TXTFILES. If wildcards won't work, explicitly name all the files you want to move, separating the source filenames with commas: Move AUTOEXEC.BAK,CONFIG.BAK C:\BACKUPS.

DOS informs you if the destination subdirectory doesn't exist and asks if you want to create it. This feature saves time, but it comes back to haunt you if you attempt to move files to the root directory. For some reason, DOS doesn't know that the root directory exists and asks, *Make directory c:\? [yn]*. Although you know the root directory exists, press Y and the files will be moved.

Move, like its older cousin Copy, doesn't warn you if the files you're moving will overwrite files of the same name. This requires that you know what files exist on the destination end of your move.

With Move, it's also possible to rename a file as it's being moved, but only if you're moving a single file. The syntax that accomplishes this is Move OLDNAME.EXT C:\DEST-

NEWNAME.EXT.

Use this trick to rename a subdirectory, too. For example, use Move C:\SEP93 C:\OCT93 to rename your monthly project subdirectory.

Note that Move isn't as complex as the "prune and graft" commands found in some file managers. All Move can do is change the name of the subdirectory; it can't change its position on the directory tree. To relocate a directory full of files on the directory tree, create the new subdirectory, use Move to put the files in the new location, and then remove the old subdirectory.

Since the old subdirectory is now empty, it will be easy to remove it the traditional way—with RD. However, when circumstances call for you to delete subdirectories full of files, you'll want to use DOS 6's Deltree command.

Prior to DOS 6, removing a subdirectory could be a chore. DOS wouldn't remove a subdirectory containing files, so you had to erase the files before using RD. If the subdirectory contained hidden files, the DOS Erase command missed them, but RD knew they were there and refused to delete the directory. So, you had to use the Attrib command to make the hidden files visible and then erase them before you could remove the subdirectory. If you had subdirectories nested within subdirectories, you had to start at the lowest level and repeat this process as you worked your way up.

Deltree untangles this sticky web. Typing *deltree path* wipes out the subdirectory, all of its files—including system, hidden, and read only—and the subdirectories nested within it.

It's powerful, but dangerous, so make certain you know what you're doing. Even Undelete running in Delete Sen-

try mode can't bring back files that were stored in deleted subdirectories.

Normally, unless you use the /y switch, Deltree will ask for a confirmation before it takes any action. Sometimes, though, it returns to the DOS prompt without saying anything. This simply means that Deltree didn't find the subdirectory you specified. You may have made a typo as you entered its name or failed to identify the entire pathname. Try again. If you're successful, you'll receive a confirmation request followed by the message *Deleting pathname. . . .*

Deltree suffers from some other anomalies. First, if you try to delete the current subdirectory, Deltree's messages will indicate that it's being done, but the operation won't be complete. The files and any subdirectories will be removed, but the active subdirectory won't be deleted. Second, if the subdirectory you're removing has any of its attributes set, Deltree thinks the subdirectory is a file and prompts you with *Delete file "filename"? [yn]*. Although the prompt is erroneous, Deltree takes the expected action and deletes the specified subdirectory.

Finally, either one of these commands can help you correct an illegal-directory-name problem. For example, although spaces aren't allowed in directory names, some applications or installation programs manage to create directory names with spaces in them.

To delete such a directory with Deltree, place quotation marks around the directory name when typing the Deltree command: *deltree "93 data"*.

If you just want to change the directory name so it's legal, use Move, again surrounding the illegal name with quotation marks when you enter it: *move "93 data" data.* □

These two new disk-management commands make it easier to work in DOS 6.

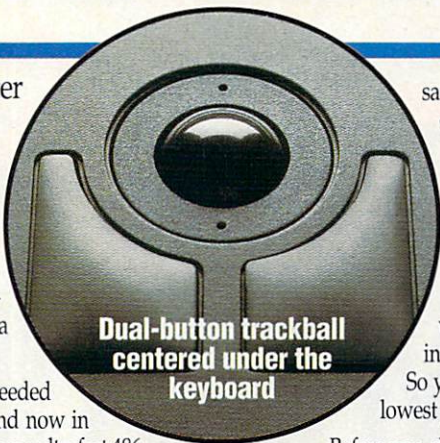
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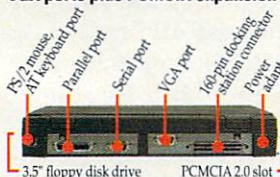
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Mark Minasi

DOS 6's MULTICONFIG, PART 3

In the August column, I suggested one way to easily combine a number of AUTOEXEC.BATs into a single MultiConfig-ready file. If you tried experimenting with your system, perhaps you learned that the configuration names get passed to AUTOEXEC.BAT in the same case that you wrote them in CONFIG.SYS. If the configuration name is *interlnk*, don't write the IF statement as `IF %config%==INTERLNK GOTO . . .`, for that'll never match. The case must match; the statement would have to be `IF %config%==interlnk GOTO . . .`.

If you're batch-savvy, you may know about the CALL statement. The CALL statement makes it possible for one batch job to activate another batch job without DOS's forgetting about the original batch job. For you nonbatchers, activating one batch program from inside another doesn't ordinarily cause DOS to finish the first batch job once the second has been run. For example, assume that you have a batch job called X.BAT that looks like this.

```
@echo off
echo Message from X
Y
echo Last message from X
```

Also, assume that you have a batch program called Y.BAT that looks like this.

```
@echo off
echo Message from Y
```

Running X will result in the screen's showing this.

```
Message from X
Message from Y
```

There will be no Last message from X.

That's because starting one batch program from inside another batch program causes COMMAND.COM—the program that executes batch programs—to load Y.BAT in anticipation of executing it and to accidentally overwrite X.BAT in COMMAND.COM's memory. As a result, when Y ends, COMMAND.COM returns to the command prompt, not to the finishing lines of X.BAT. If, on the other hand, the line Y that stands by itself in X.BAT is replaced by CALL Y, COMMAND.COM will remember X.BAT, and the output will be as follows.

```
Message from X
Message from Y
Last message from X
```

The CALL command will, then, provide an alternative to inserting the various AUTOEXEC.BATs physically into the master AUTOEXEC.BAT. To apply this, recall the AUTOEXEC.BAT that we ended up with in August looks like this, with three sections.

```
@ECHO OFF
IF %config%==standard GOTO
STANDARD
IF %config%==maxmemory GOTO
MAXMEMORY
IF %config%==wingcomm GOTO
WINGCOMM
:STANDARD
PROMPT $P$G
PATH C:\DOS
DOSKEY
PRINT /Q
SMARTDRV
GOTO END
:MAXMEMORY
PROMPT $P$G
PATH C:\DOS
LH DOSKEY
GOTO END
:WINGCOMM
CD\GAMES\WC2 WC2
GOTO END
```

The standard section is the stuff that you usually use, the interlnk section sets up an interlnk server, and the wingcomm section sets up a configuration that allows Wing Commander II—a very memory-intensive game—to run. But instead of merging these files, imagine that you have batch files called STANDARD.BAT, MAXMEM.BAT, and WINGCOMM.BAT. Inside the sections you could simply insert CALL STANDARD, CALL MAXMEM, or CALL WINGCOMM. The final AUTOEXEC.BAT look like this.

```
@ECHO OFF
IF %config%==standard GOTO
STANDARD
IF %config%==maxmemory GOTO
MAXMEMORY
IF %config%==wingcomm GOTO
WINGCOMM
:STANDARD
CALL STANDARD
GOTO END
:MAXMEMORY
CALL MAXMEM
GOTO END
:WINGCOMM
CALL WINGCOMM
GOTO END
:END
```

Now, there's an even more compact way of doing this that involves just doing the CALL statements from inside the IFs; the AUTOEXEC.BAT would look like this.

```
@ECHO OFF
IF %config%==standard CALL
STANDARD
IF %config%==maxmemory CALL
MAXMEM
IF %config%==wingcomm CALL
WINGCOMM
```

That's probably an acceptable alternative, and it certainly makes converting a bunch of configurations to a single AUTOEXEC.BAT easier, but it won't work if the %config% variable gets altered by one

Use DOS 6's
MultiConfig and
batch files
to supercharge your
AUTOEXEC.BAT
and CONFIG.SYS files.

of the batch files. The chances of that happening are small, so this may be the simplest method of unifying AUTOEXEC.BATs for most people.

If you're a batch expert, a look at the amalgamated batch file above will probably lead you to notice that I could've reorganized some of the statements to make the AUTOEXEC.BAT smaller. That's certainly true, and if you want to do that for your AUTOEXEC.BAT, go ahead. I didn't because I like the clearly defined separate areas for the different configurations.

Making It Simple

Let's get back to the CONFIG.SYS part of MultiConfig. In my example, I end up with a CONFIG.SYS that looks like this.

```
[menu]
menuitem normal,Standard setup
menuitem interlnk,Setup with
  Interlnk driver
menudefault normal,2
```

```
[normal]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

```
[interlnk]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\INTERLNK.EXE
```

You'll notice that a group of statements is common to both configurations. There are just a few statements that you can expect all configurations to have—perhaps an essential device driver, FILES/BUFFERS/LASTDRIVE/STACKS statements, and the like. In the case of my example configuration, the commands

that are common to the two configurations are as follows.

```
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

You can save yourself some typing by extracting a common group of statements and making it a block by giving it a block name and using the MultiConfig command INCLUDE. Just remove the group of statements from all configurations that use it, and precede it with a name in brackets, just like the configurations that you've been building so far.

Where the group of statements used to be in each configuration, insert the phrase INCLUDE [blockname], where blockname is whatever you've called the block of statements common to the configurations. For example, if I create a block called [shared] that contains the statements that are shared between the configurations, the CONFIG.SYS looks like this.

```
[menu]
menuitem normal,Standard setup
menuitem interlnk,Setup with
  Interlnk driver
menudefault normal,2
```

```
[shared]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

```
[normal]
INCLUDE shared
```

```
[interlnk]
INCLUDE shared
DEVICE=C:\DOS\INTERLNK.EXE
```

You can have as many INCLUDE blocks as you like. For example, you might have

an INCLUDE block with your memory management commands (EMM386/HIMEM/DOS=HIGH,UMB), another with your LAN drivers, another with Interlnk commands, and so on.

If you have a bunch of statements that are common to all configurations, you can create a block containing those statements, and then include them in each block. But there's an easier way: using the [common] block.

There's a predefined block called [common], which, if included in your CONFIG.SYS, will automatically be executed at the end of every configuration. Just include [common] on a line and follow it with whatever statements you want to see executed, no matter which configuration gets selected.

I strongly recommend that you have a [common] block and that you put it at the end of your CONFIG.SYS. That way, when you install a program that inserts commands into your CONFIG.SYS statement, the new statements will usually be placed at the end.

If the last block is the [common] block, you know that the statements will be executed; if the last block isn't the [common] block, the newly inserted statements won't be executed unless the last block happens to get executed, which would probably cause the newly installed program to fail.

Speak Up!

Do you have a tough hardware problem that you would like Mark to tackle? Let him know about it by calling (900) 884-8681, extension 7010202. The call will cost 95 cents per minute, you must be 18 or older, and you must use a touch-tone phone. Sponsored by Pure Entertainment, P.O. Box 186, Hollywood, California 90078. □

PROGRAMMING POWER

Tom Campbell

PARADOX AS A WINDOWS DATA-BASE MANAGER

This month, I find myself in a strange position. I'm going to tell you why I think Paradox is a great Windows database manager to use for serious applications development. Then I'm going to tell you to break all the rules. Borland has some of the best manuals I've ever seen for a language product, but it tells you to use them the wrong way. Below, you'll find my new rules, which will tell you how to use them the right way.

Remember that I'm looking at this from a programmer's standpoint, but you don't need experience in any other computer languages to learn how to program Paradox. It will take a while, probably at least three months, to get the hang of it if you've never programmed before. This is true for any programming language. Learning ObjectPAL (*PAL* stands for *Paradox Application Language*) is very easy in some respects but daunting in others. It is well worth the time you put into it.

1. **Read the tutorial first if you don't think you need it; read The ObjectPAL Developer's Guide first if you think you need the tutorial.** The Borland documentation says you should read the Learning ObjectPAL tutorial if you don't have any programming experience. The problem is that it jumps right into hard-core concepts like objects and methods while neglecting to explain more basic things like constants and variables. All are important, but the basics are called that for a reason. They should always come first. If you understand none of these things, worry not. The Borland manuals offer hope if

you break the rules. The ObjectPAL Developer's Guide, ostensibly for programmers who have read Learning ObjectPAL and are now ready to start developing full-fledged applications, has four introductory chapters that really belong in the tutorial. They are very well written, just misplaced. The first rule, then, is to read chapters 1-4 of The ObjectPAL Developer's Guide if the Learning ObjectPAL book leaves you a bit unfulfilled. None of this is to say that the guide falls short. It's a milestone in Borland documentation and should be a model for all language products. Usually, languages give you a reference and, if you're lucky, a tutorial. The problem is what happens in between. They never seem to have a book that addresses the needs of the person who has mastered the rudiments but doesn't know where to go next. It's the basis of a multi-million-dollar book industry. I'm delighted to see Borland tackling this very difficult subject. I'd like to see Borland do the same thing with its Pascal and C products, and Microsoft should do the same with its languages.

2. **Use the reference as a tutorial no matter what.** As good as The ObjectPAL Developer's Guide is (and that's very good), you can learn even more by thumbing through The ObjectPAL Reference. Reference books aren't designed to be used as tutorials or even to be browsed. You're expected to have an idea of what you're looking for before you crack the book. ObjectPAL is such a big language that no tutorial could cover all its facets. Spend an occasional lunch hour or bus ride just thumbing through The ObjectPAL Reference, and you will assuredly discover useful, timesaving features

that you might never learn about otherwise. Do this once while you're learning ObjectPAL, expecting to learn very little, and then several times after you've learned it. It's a synergistic process. The more you learn about ObjectPAL, the more useful these free-form sessions will become and the more they'll help you learn the language. A side note: If you're trying to learn how to program Windows in C, this technique might be the glue you need to hold together the concepts you've been learning.

3. **Quit planning.** The ObjectPAL Developer's Guide quotes the party line of database programming, which is that you should plan an application extensively before starting it. This may make sense in large corporations, although there is ample evidence suggesting this isn't automatically true. It's also the first rule of every database textbook written since the Jurassic Period. Throw that rule out the window if you use Paradox. Object-oriented programming tends to seal off the parts of large programs in such a way that shuffling them around and trying out new ideas is easier than it ever was before with traditional programming techniques. Paradox enforces many good object-oriented techniques, and because of this, I've had a lot more, well, fun letting applications evolve naturally.

The Paradox programming environment is responsive, efficient, flawlessly designed, and a joy to use. Borland's language manuals used to be full of corny jokes and asides about just how fun the products were to use. And they were right! Paradox 1.0 is as cool as Turbo Pascal 1.0 was, but the manuals forget to mention it. Quit planning. Learn the language, but play as you go. The rest will take care of itself. □

Read the tutorial first if you don't think you need it; read The ObjectPAL Developer's Guide first if you think you need the tutorial.

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GREAT SH

WHATEVER YOU NEED TO DO, YO

What would you expect to pay for a good word-processing program: \$200 or \$400—or even more? How about \$5—or even less? That's what some ads for shareware products imply. Shareware is an inexpensive method of distributing software that relies on an author's efforts—and the integrity of the program's users. Shareware authors give away copies of their programs for free or for low disk duplication charges.

The programs typically contain messages asking you to send money if you like and use them. If enough users like a particular program enough to send in the recommended payment, the author will recoup his or her investment of time and effort.

Contrary to what some ads imply, the actual value of a shareware product can range from nothing to several thousand dollars. While the price you pay for a disk may be just a couple of dollars, the actual program can be worth much more.

Advantage

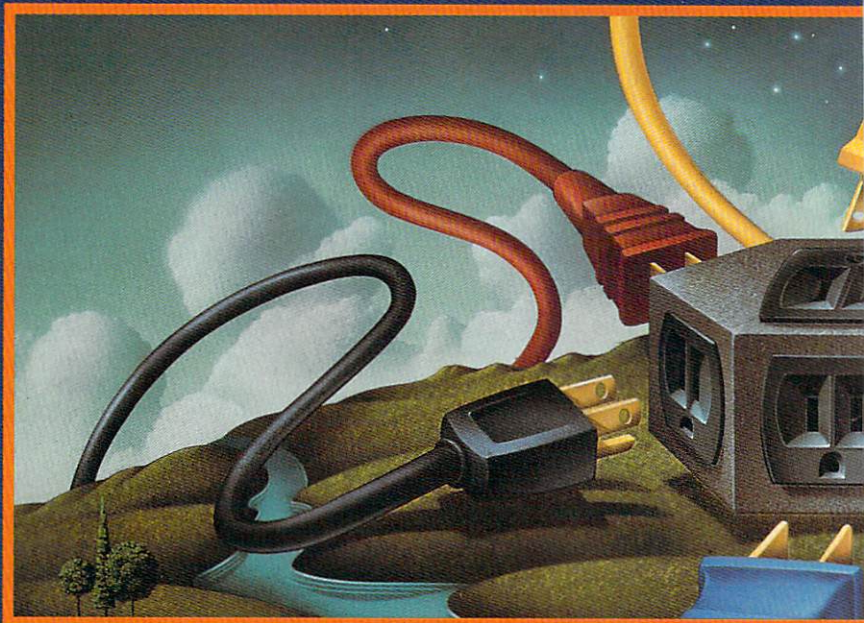
Shareware offers an author an excellent opportunity to be in complete control of the product. The alternative is to sell or license it to a publisher, who may change it or decide it isn't worth the effort to promote it. A shareware author gets all of the profits from his or her program—not a small royalty fee for each copy sold.

Shareware offers the user one of the best ways to determine whether the software has the needed features and power.

Contract

There are many variations on the shareware contract. Some programmers encourage you to try the program for a period of time, after which you're expected to send in a specified amount of money. As with commercial products, there are both reasonably priced and overpriced shareware-

registering it according to the terms in the contract is technically a violation of copyright laws, although neither the Association of Shareware Professionals nor the Software Publishers Association has prosecuted such a copyright violation, according to Jan Abbott, executive director of the Association of Shareware Professionals,



products. Other programmers ask you to send in whatever amount you feel is reasonable. Still others offer a demonstration version of a program and encourage you to register by sending a more fully featured program when the registration fee is received.

Most shareware is copyrighted, and using the shareware without

and Ken Wasch, executive director of the Software Publishers Association.

Many users choose to send in shareware payments for programs that they actually use. It's an excellent way to tell the author that you care about the effort that went into writing the program and to encourage future versions. In

AREWARE

YOU CAN DO IT WITH SHAREWARE.

In addition, most authors will give technical support (if any is available) only to registered users and will notify them about new versions and upgrades when they become available.

A variation on shareware is blackmailware. These programs look like shareware products, but they won't give you full access

another shareware product that doesn't restrict you.

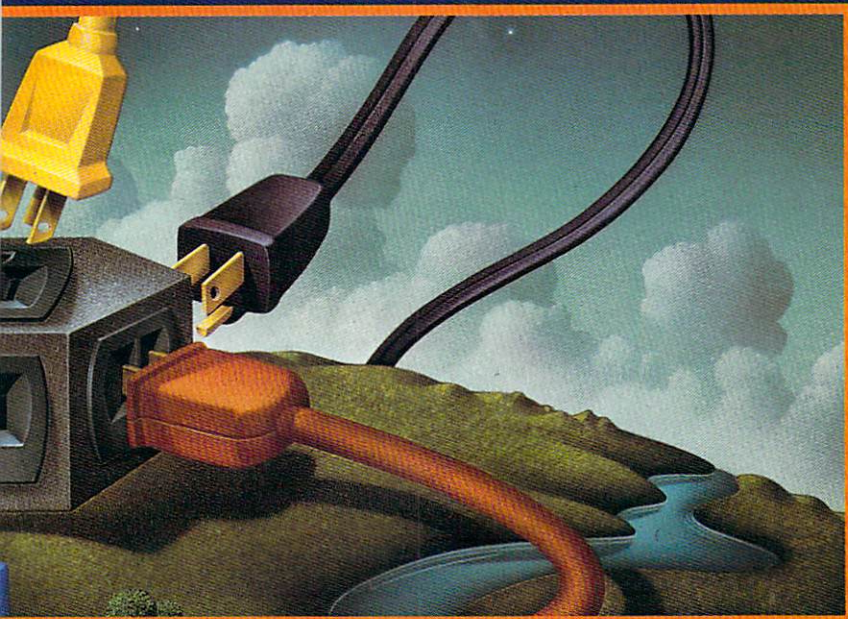
Some restrictive shareware programs purposely destroy themselves after a given period of time unless they've been registered. After you pay the registration fee, you're given either a new version or a password that disables the erase function in your copy.

programs. A demo program is generally a limited version of the real program—enough for you to see how the program works but not enough for you to use it for any practical application. For example, the program may lock out the capability to save files or print them. Rather than prompting you to send in a registration fee, these programs are intended to whet your appetite for the features and power you glimpse so that you will buy the fully operational commercial version. Technically, these programs are just fancy advertisements, but shareware collections often include them.

Most shareware products are fully operational programs or utilities, and for the most part, they have reasonable registration fees. Some of the best shareware programs have innovative payment methods. For example, some authors ask you to donate money to their favorite charities as a registration fee. Beerware authors request that you make a toast in honor of the programmer if you like the product.

Many shareware contracts include limitations on how the shareware can be used. A program may be limited to noncommercial uses, or there may be limitations on how its data can be distributed. Typically, there is a pricing tier where noncommercial users are asked to send in smaller payments than commercial users. Site licenses are often available as options.

Many businesses require some kind of invoice before they can pay for anything, and most shareware



until you send in the required payment. Obviously, a program that doesn't permit complete access forces you to buy the unlocked copy if you wish to use it. While there are several blackmailware programs, they aren't widely distributed simply because they are so annoying to users. It's almost always easier just to search for

A variation on the password theme is a program that constantly prompts you to send in your registration payment. When your payment is received, you're given a password that disables the prompt.

Even major software companies get into the shareware act. Many distribute commercial demo

programs include invoice-printing functions for businesses' convenience.

Avoiding the Plague

One of the biggest concerns with shareware is how it enters the distribution channel. With a commercial program, you know that all of the disks were written by the manufacturer, probably with the same disk duplication equipment and hopefully with strict quality control. It's unlikely, although not impossible, for a virus to be accidentally distributed with a commercial product.

On the other hand, shareware products often go through many intermediate duplications before they reach the consumer, with no guarantee of antivirus precautions. In addition, most shareware products are distributed as plain, unsealed disks. How can you protect yourself from viruses when you're using software that's passed through so many hands?

Many shareware distributors advertise their products as virus-free, accepting responsibility for the integrity of the media they distribute. Some shareware designed for the retail market comes in fancy packaging (fancy for shareware) with a seal labeled virusproof. Whether or not that seal can prevent a virus from get-

ting into the duplication process is debatable. In any case, you should treat any floppy disk you receive, whether it's shareware, commercial software, or a data disk, as potentially infected. Make it a practice to scan disks with a virus checker.

Swimming the Channel

Some companies will charge as much as \$5 or \$10 per shareware disk; others will charge as little as \$1 for the same product. What's the difference? Shareware sold from a retail store oriented toward fancy packaging (for example, most shopping mall software stores) will probably come in a fancy package with a display card. That packaging translates into increased costs passed on to the user. On the opposite end of the price spectrum, the least expensive shareware often comes without guarantees or exchange privileges—even for damaged disks. In any case, there's no credible reason for paying more than \$2-\$5 per disk for shareware products.

With the proliferation of CD-ROM drives and reduced prices for both drives and media, shareware CD-ROM collections have become popular. A huge collection of shareware programs can be put onto a single CD-ROM and distributed much less expensively than

the equivalent stack of floppy disks. It's a good bet that files on a CD-ROM do not have any viruses, but this is not an absolute guarantee. Conceivably, the files on a CD-ROM could have embedded viruses, if the person who assembled the programs wasn't careful. It's also possible that the utilities you use to transfer files from the CD-ROM to your computer—or even your computer's operating system—could have a virus that could affect the programs as you use them.

It's important to note that while you pay for a shareware CD-ROM, you pay for the physical medium, not the programs on it. You are still expected to send in your shareware registration fees. The primary disadvantage of shareware CD-ROMs is that the discs may have dated shareware. Publishers pay a high one-time cost each time a new CD-ROM is mastered, and many companies are reluctant to remaster their collections until they start to lose sales.

Being a read-only medium, CD-ROMs are limited in their usefulness for many applications. Data files (graphic libraries are a good example) can remain on the CD-ROM for loading into memory as required. But many programs must first be transferred from the CD-ROM to your hard

IF YOUR  IDEA OF A GOOD TIME

IS SITTING ALONE IN THE DARK,



FIGHTING OFF EVIL FORCES

'TIL THE SUN  COMES UP...>>>

drive before they can be used. Despite the huge capacity of a CD-ROM, many publishers also compress the files on the disc, which means that a decompression utility transfers the files to your hard drive.

Happy Hunting

So what is available in shareware? Everything from truly free programs without any financial obligations up through multithousand-dollar vertical-market products. You can obtain clip art, databases of information, or useful productivity programs.

The primary advantage of shareware is the concept of checking something out before you make your full payment. For the most part, commercial software is sold on the you-break-it-you-bought-it principle—it in this case referring to the product's shrink-wrap. As a rule, the only guarantee you have of the product's performance is its advertisements, the company's reputation, and the opinions of friends and reviewers. With shareware you're actually encouraged to test before you invest.

There are many good shareware productivity products. Which product is better is often a matter of personal preference, but there are many programs that are generally considered

excellent. Here are some of my favorites. It would be possible to run a business office using only programs from this short list.

Word processing. So far, a shareware product on the level of Microsoft Word or WordPerfect has not appeared, but if you need a functional, friendly DOS word processor for writing letters, short documents, and notes, PC-Write is an excellent, inexpensive shareware choice.

Spreadsheet. The capabilities of shareware spreadsheet programs like PC-Calc, Express-Calc, and Free Calc compare favorably with those of professional programs like VisiCalc and Lotus 1-2-3. The documentation for these shareware products is not on a par with the documentation shipped with the professional products, but if you already know how to use a spreadsheet program, you'll probably be satisfied with their performance.

Database. As a file-card-style database program, PC-File or File-Express performs adequately. If you need a more relational database utility, try 1 on 1 = 3, a workalike clone of dBASE III. Also, keep an eye out for WAMPUM.

Communications. Telecommunications programs are one area where shareware really excels. Procomm is one of the most popular com-

munications programs, even when considering professional products. It's gone professional (Procomm Plus for Windows was a COMPUTE Choice award winner), but version 2.43 is still available in shareware collections.

Other categories where there are excellent shareware productivity programs include graphics, desktop publishing, and utilities.

Until recently, there wasn't much Windows shareware available. Several shareware programming utilities for Windows programmers have made it easier to develop Windows-based applications, and there are now collections of shareware Windows programs.

Sharing Is Caring

The biggest shareware question is, if shareware is better than commercialware, why would anybody buy commercial software?

The primary disadvantage of shareware is explained by Sturgeon's Law. Science-fiction author Ted Sturgeon once shocked his colleagues by stating, "Ninety percent of science fiction is crap." He continued, "But so is 90 percent of everything else." Well, shareware probably approaches the 99th percentile. With commercial programs, especially those from a reputable company, you

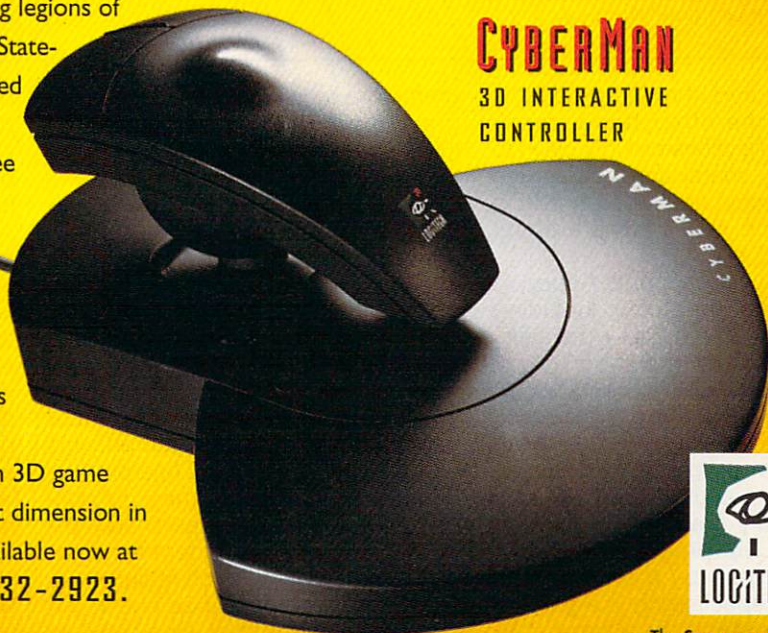
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Hotware

What's hot in shareware? We called CompuServe to get the titles of the hottest shareware and freeware. Here's the list.

Windows

Here are some of the most popular Windows shareware and freeware packages on CompuServe.

1. Switcher (filename SWITCH.ZIP); 15,943 bytes. This utility lets you quickly switch video modes.
2. Monitor Saver (filename MS20B.ZIP); 16,700 bytes. This screen saver includes five blanking options.
3. Flipper (filename FLIPPE.ZIP), 6530 bytes. Flipper is a utility that flips the printer orientation from portrait to landscape when you double-click on its icon.
4. Makefont (filename MAKEFO.ZIP); 11,389 bytes. Makefont converts the fonts found in your system ROM into Windows FNT files.
5. Gtoys (filename GTOYS.ZIP); 40,128 bytes. This fractal generator draws Mandelbrot, Julia, and fractal dragon sets.
6. WinTak (filename WINTAK.ZIP); 101,376 bytes. WinTak is a Windows video benchmark that analyzes the performance of your video card. Created by Texas Instruments, it uses the TI 34010 or TI 34020 graphics accelerator as the standard against which your video card is measured. It requires Windows 3.1.

7. POSTNET Bar Code Font (filename POSTAL.ZIP), 7347 bytes. This file is actually a font file that contains TrueType and ATM versions of the bar code used by the U.S. Postal Service. It will print the nine-digit ZIP code or the POSTNET bar code on envelopes.

8. DisplayText (filename DRVTST.ZIP); 93,249 bytes. This utility tells the user about the display technology in use by Windows. It also can list all of the modules loaded, giving expanded file data about them.

9. DISK SPOOL (filename DS.EXE); 118,151 bytes. This is a print spooler for Windows.

10. WinZip (filename WINZIP.ZIP); 153,964 bytes. This is a shell for all of the most popular archiving products, such as PKZip and LHARC. This does not actually include the archiving products, which must be downloaded or purchased separately.

DOS

Here are some of the most popular DOS shareware and freeware packages on CompuServe.

1. UMBDVR.EXE; 40,389 bytes. This utility uses shadow RAM to provide upper memory and XMS to provide EMS for DOS 5. It loads high.
2. LXEX91.ZIP; 43,975 bytes. It compresses EXE files (typically 30-40 percent) while leaving the files executable. Warning: Screen messages are in French.

3. TSR.COM; 75,277 bytes. This is a library of TSR management utilities including the well-known utilities Mark and Release.

4. FDATE.ZIP; 60,477 bytes. This utility allows you to use date manipulation in batch files. Use it to put the date of your choice into an environment variable.

5. JCScroll (filename JCSCRO.ZIP), 8202 bytes. This TSR screen-scrolling utility lets you scroll the screen backward to see information that has scrolled upward off the screen.

6. VIRX.ZIP; 107,708 bytes. This virus scanner has 1300 virus strings and will identify over 1400 viruses.

7. DIET (filename DIET14.ZIP); 40,925 bytes. This utility compresses executable files and data files. It decompresses and compresses on the fly as a TSR, thus saving disk space.

8. PRINDIR (filename PRINDI.ZIP); 28,328 bytes. This TSR allows redirection of printer output from one LPT or COM port to another port, to a disk file, or to the screen.

9. MEMKIT.ZIP; 140,547 bytes. This creates upper memory from shadow RAM and loads TSRs and device drivers into high memory on 8088s and 80286s.

10. LIST Plus (filename LIST77.EXE); 108,729 bytes. This file browser and viewer includes menuing, selective printing, and a telephone dialer.

can be fairly sure that the product is useful. On the other hand, many shareware collections proudly claim to include every shareware program the distributors could find, actually taking pride in being indiscriminate about what they include.

Generally, you get better support for commercial programs, including better help screens, better manuals, and better telephone support. As a rule, a programmer who can write an excellent program probably can't write a good instruction manual. With a commercial program, the manual, packaging, and other components were probably created by different specialists. The program itself was probably written by a team—each programmer specializing in a particular module. Most shareware pro-

grams are individual efforts; the programmer is the manual writer, the tutorial writer, and the technical support department.

Another disadvantage of a single-author effort is bad programming habits. All programmers have them, and they range from simple typos and crude menus to calculation mistakes. With multiple programmers it's less likely that mistakes will get by.

The best shareware eventually becomes commercialware. The author may suddenly realize that a product is popular enough to start a one-product business. A program may be purposely first introduced as shareware to evaluate users' responses: what features they want, which features are confusing, which features cause the program to freeze solid. Or a software

publisher may offer to purchase a product. When this happens, the last shareware version often remains on bulletin boards as an advertisement for the commercial product.

Even with the limitations, there are many good shareware products that are certainly worth searching for. But is it worth paying \$1 to \$5 per disk and sifting through hundreds of shareware programs until you find one you want? Again, Sturgeon's Law applies. It's best to assume that the good products you find will make up for the effort of winnowing the rest. Under the worst circumstances, you can always reformat the disk and partially recoup your loss with a blank disk.

Occasionally, you will find shareware specials. In an effort to reduce stock or use it as a loss leader to get

TECHNOLOGY UPDATE

900 MHz breakthrough!

New technology launches wireless speaker revolution...

Recoton develops breakthrough technology which transmits stereo sound through walls, ceilings and floors up to 150 feet.

By Charles Anton

If you had to name just one new product "the most innovative of the year," what would you choose? Well, at the recent *International Consumer Electronics Show*, critics gave Recoton's new wireless stereo speaker system the *Design and Engineering Award* for being the "most innovative and outstanding new product."

Recoton was able to introduce this whole new generation of powerful wireless speakers due to the advent of 900 MHz technology. This newly approved breakthrough enables Recoton's wireless speakers to rival the sound of expensive wired speakers.

Recently approved technology. In June of 1989, the *Federal Communications Commission* allocated a band of radio frequencies stretching from 902 to 928 MHz for wireless, in-home product applications. Recoton, one of the world's leading wireless speaker manufacturers, took advantage of the FCC ruling by creating and introducing a new speaker system that utilizes the recently approved frequency band to transmit clearer, stronger stereo signals throughout your home.

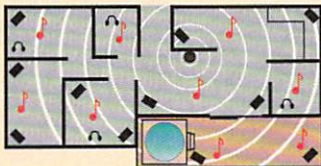


Crisp sound throughout your home. Just imagine being able to listen to your stereo, TV, VCR or CD player in any room of your home without having to run miles of speaker wire. Plus, you'll never have to worry about range because the new 900 MHz technology allows

150 foot range through walls!

Recoton gives you the freedom to listen to music wherever you want. Your music is no longer limited to the room your stereo is in. With the wireless headphones you can listen to your TV, stereo or CD player while you move freely between rooms, exercise or do other activities. And unlike infrared headphones, you don't have to be in a line-of-sight with the transmitter, giving you a full 150 foot range.

The headphones and speakers have their own built-in receiver, so no wires are needed between you and your stereo. One transmitter operates an unlimited number of speakers and headphones.



Recoton's transmitter sends music through walls to wireless speakers over a 75,000 square foot area.

stereo signals to travel over distances of 150 feet or more through walls, ceilings and floors without losing sound quality.

One transmitter, unlimited receivers. The powerful transmitter plugs into a headphone, audio-out or tape-out jack on your stereo or TV component, transmitting music wirelessly to your speakers or headphones. The speakers plug into an outlet. The one transmitter can broadcast to an unlimited number of stereo speakers and headphones. And since each speaker contains its own built in receiver/amplifier, there are no wires running from the stereo to the speakers.

Full dynamic range.

The speaker, mounted in a bookshelf-sized acoustically constructed cabinet, provides a two-way bass reflex design for individual bass boost control. Full dynamic range is achieved by the use of a 2" tweeter and 4" woofer. Plus, automatic digital lock-in



Breakthrough wireless speaker design blankets your home with music.

tuning guarantees optimum reception and eliminates drift. The new technology provides static-free, interference-free sound in virtually any environment. These speakers are also self-amplified; they can't be blown out no matter what your stereo's wattage.

Stereo or hi-fi, you decide. These speakers have the option of either stereo or hi-fi sound. You can use two speakers, one set on right channel and the other on left, for full stereo separation. Or, if you just want an extra speaker in another room, set it on mono and listen to both channels on one speaker. Mono combines both left and right channels for hi-fi sound. This option lets you put a pair of speakers in the den and get full stereo separation or put one speaker in the kitchen and get complete hi-fi sound.



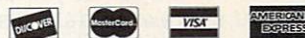
These wireless stereo headphones have a built-in receiver.

Factory direct savings. Because of our commitment to quality and our factory direct pricing, we sell more wireless speakers than anyone! For this reason, you can get these speakers far below retail with our 90 day "Dare to Compare" money-back guarantee and full manufacturer's warranty. Through this limited time offer, the Recoton transmitter is only \$69. It will operate an unlimited number of wireless speakers priced at only \$89 and wireless headphones at \$59 each. So take advantage of this special offer to fill your home with music. Your order will be processed in 72 hours.

Recoton Transmitter.....\$69 \$4 S&H
Wireless products compatible with the Recoton transmitter.
Recoton Wireless Speaker.....\$89 \$6 S&H
Recoton Wireless Headphones.....\$59 \$4 S&H
Please mention promotional code **161-CU1103**.

For fastest service call toll-free 24 hours a day

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To order by mail send check or money order for the total amount including S&H (VA residents add 4.5% sales tax). Or charge it to your credit card by enclosing your account number and exp. date. Send to:

CONTRAD INDUSTRIES

2820 Waterford Lake Drive Suite 106
Midlothian, Virginia 23113

AWARD WINNING WIRELESS SPEAKER

Built-in receiver and amplifier:

The wireless speaker and headphones both contain a built-in receiver and amplifier. Signals are picked up and transmitted as far as 150 feet away through walls without the use of wires.



Volume Power Tuning Tuned ports
2" tweeter
4" woofer
Individual left, right & mono switch and Individual bass boost control (on back)
Size: 9"H x 6"W x 5.5"L
Signal-to-noise ratio: 60 dB
Channel Separation: 30 dB
Two-way bass reflex design
10 watts/channel RMS amps
Frequency Response: 50 Hz-15 KHz

Don't take our word for it. Try it yourself. We're so sure you'll love the new award-winning Recoton wireless speaker system that we offer you the *Dare to Compare Speaker Challenge*. Compare Recoton's rich sound quality to that of any \$200 wired speaker. If you're not completely convinced that these wireless speakers offer the same outstanding sound quality as wired speakers, simply return them within 90 days for a full "No Questions Asked" refund.

Recoton's Design and Engineering Award



Shareware Sources

Here is a list of some sources for shareware. Remember that shareware is also available for downloading from online services and bulletin board services.

American Software
P.O. Box 509, Ste. M22
Roseville, MI 48066

The Amish Outlaw
3705 Richmond Ave.
Staten Island, NY 10312
(800) 947-4346

Bright Futures
P.O. Box 1030
E. Windsor, CT 06088
(800) 235-3475

Caloke Industries
P.O. Box 18477
Raytown, MO 64133
(816) 478-6185

Chestnut CD-ROM
222 Third St., Ste. 3212
Cambridge, MA 02142
(617) 864-8326

Christella Enterprise
P.O. Box 82205
Rochester, MI 48307

Compro Software
P.O. Box 4426
Star City, WV 26504
(304) 599-7183

Crosley Software
Box 276
Alburg, VT 05440
(514) 739-9328

Disks O'Plenty
8362 Pines Blvd., Ste. 270
Pembroke Pines, FL 33024
(305) 963-7750

Finto Software
Rte. 2, Box 44
Rosebud, TX 76570
(817) 583-2151

Free Spirit Software
720 Sycamore St.
Columbus, IN 47201
(800) 638-5757
(812) 376-9964

IkeaMo Enterprises
255 W. 300N
Howe, IN 46746
(219) 463-5246

M & M Computing
43 Maple St.
Newburgh, NY 12550
(914) 569-0510

PC Shareware
1763 Garnet Ave.
San Diego, CA 92109
(800) 447-2181
(619) 272-6673

PC SIG
1030 E. Duane Ave., Ste. D
Sunnyvale, CA 94086
(800) 245-6717
(408) 730-9291

Pendragon Software Library
P.O. Box 56
E. Greenwich, RI 02818
(800) 828-3475
(401) 884-6825

The Profit Group
2956 N. Campbell Ave.
Tucson, AZ 85719
(800) 843-7990
(602) 577-9696

Save-On Software
P.O. Box 1312
Wilkes-Barre, PA 18703
(800) 962-6107
(717) 822-9531

Shareware Central
P.O. Box 897
29 Erie St. N
Wheatley, ON
Canada N0P 2P0
(519) 825-7480

SoftShope
P.O. Box 247
Artesia, CA 90701
(800) 829-2378
(310) 802-1333

Software Labs
100 Corporate Pointe, Ste. 195
Culver City, CA 90231
(800) 569-7900
(310) 410-3040

Software of the Month Club
5816 Dryden Pl.
Carlsbad, CA 92008
(619) 931-8111

Software Twenty Twenty
P.O. Box 1078
Lorton, VA 22079
(800) 800-3122
(703) 339-0961

Value Software
P.O. Box 4638
Medford, OR 97501

Walnut Creek CD-ROM
1547 Palos Verdes, Ste. 260
Walnut Creek, CA 94596
(800) 786-9907
(510) 674-0783

Windows 900
P.O. Box 85178
Las Vegas, NV 89185
(702) 386-8048

more sales elsewhere, a distributor might charge a dollar or less for each shareware disk, or \$20-\$30 for a CD-ROM with 500MB of shareware. If you can find shareware at those prices, it's difficult to go wrong.

Strictly Business

In addition to programs, you can find excellent shareware data files. For example, you can get an entire library of prewritten generic business correspondence as text files that you can load into your word processor and edit to suit your needs. You'll find pre-made spreadsheet and desktop pub-

lishing templates, and a museum's worth of clip art.

It's not unlikely that you could start and run a business office using shareware exclusively. At some point you might want to move to commercial software, but there's no less expensive or less risky way to get started.

The high popularity of shareware has forced the software industry to become more competitive. Originally, commercial software publishers looked down on shareware products as amateurish and unsophisticated. But as shareware has proliferated, it

has influenced the commercial software industry. Many commercial products have reduced their prices to become more competitive with shareware products, and new releases often include features first introduced in shareware products.

The personal computer industry has its roots in the garage operations of people like Steve Jobs, Steve Wozniak, Paul Allen, and Bill Gates. What are the struggling little garage-style operations of today up to? By the hundreds, they're writing, debugging, and distributing shareware of every description. □

Edward Grabowski's

THE BLUE & THE GRAY




THE GETTYSBURG ADDRESS
Abraham Lincoln

Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in Liberty and dedicated to the proposition that all men are created equal.

Now we are engaged in a great civil war, testing whether that nation or conceived and so dedicated can long endure. We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this.

But in a larger sense, we cannot dedicate — we cannot



Authentic historic interludes faithfully recreate the atmosphere of the period!



Watch your armies battle in fast, high-resolution animation

Where will you fire the first shot?

Recreate the power and excitement of the Civil War! As the leader of either side in this challenging simulation, you recruit, train and direct your armies around the American countryside. When two armies clash, fight out a Micro Miniatures battle in fast, high-resolution animation! Historically authentic, *The Blue and the Gray* features up to 200 animated figures per battle, naval units and blockades, river and rail transport, breathtaking graphics atmospheric sound and music.

Includes a FREE copy of a specially commissioned book on the Civil War!

Impressions™

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Circle Reader Service Number 117
IBM PC VGA Screenshots

Impressions Software, Inc. 222 Third Street, Suite 234, Cambridge MA 02142

PRODUCTIVITY CHOICE

It's the less publicized features of this upgrade that make it so attractive.

Mark Minasi

MS-DOS 6

MS-DOS 6 is the latest version of Microsoft's best-selling operating system. The DOS 6 features that you probably haven't heard much about are, strangely, the ones that make the upgrade worthwhile. There's a lot to like in DOS 6.

Probably the most useful new feature is MultiConfig. If you have one CONFIG.SYS (and AUTOEXEC.BAT) for your normal work, another one that you use sometimes when you need the most free memory, another that's completely vanilla, and perhaps one other to play Wing Commander II, then you have to have MultiConfig. There are boot manager programs, but they always seemed to give me heartburn when I used them with OS/2 or NT.

In contrast, MultiConfig is a fairly simple program that's built into the operating system. It lets you put a pile of configurations into a single AUTOEXEC.BAT/CONFIG.SYS, and two keystrokes let you choose a specific setup that's right for today. Best of all, it coexists with other operating systems with no muss, fuss, or greasy aftertaste. So I call MultiConfig the best single reason to buy DOS 6.

But that's not all there is to this upgrade. The memory manager is better, although it isn't perfect (yet). The EMM386.EXE/HIMEM.SYS two-part memory manager shipped with DOS 5 is a good basic memory manager. It's particularly well adapted to working with Windows, and it can accomplish about 90 percent of what a full-blown memory manager like QEMM-386 or 386Max can do. DOS 5's memory manag-



er really lacks only two important tools: program placement and program squeezing. On that front, when we look at DOS 6, there's some good news, and there's some bad news.

Program placement makes it possible to say to the memory manager, "Not only do I want to load this program high—into an upper memory block—but I also want to load it to this particular location." DOS 5 can't do this, but DOS 6 can. That's the good news.

But what about program squeezing? Program squeezing is necessary when you're trying to load a program that seems very large when it begins loading but then settles down to a small memory footprint. Such a yo-yo program can cause a memory manager to erroneously refuse to load the program high. What happens is that the memory manager sees the program in its initial huge configuration and reckons that a program that large will be unable to fit into the upper memory area. As a consequence, the mem-

ory manager loads the program into low memory.

A squeeze feature allows you to inform your memory manager that a program is a yo-yo. Duly informed, the memory manager will exercise a little patience and load the program high on the basis of its final load size, not on its overstated initial load size. Other memory managers have this capability, but—here's the bad news—DOS 6 doesn't. Maybe next time?

Next on the list of new features is Interlnk. If you travel, you'll appreciate Interlnk. I travel all the time, so there are few weekdays that I'm writing with my desktop machines. Sunday through Thursday nights, I bang out PC prose on my notebook. And when I return home, I want to easily move the fruits of my labors to one of my desktop machines. But shuffling floppies around is a pain. I've tried LapLink—all the pundits say that it's the best—but I find its menus confusing. DOS 6's serial/parallel file transfer program, Interlnk, is exactly what I've been looking for.

Interlnk lets me connect two machines parallel port to parallel port and load a device driver. Then one of the machines acts like a LAN server. I had an extra parallel port, so I installed it in my desktop machine as LPT2 and put a parallel transfer cable on it. Now, when I come home, I just plug the other end of the cable into the parallel port on my notebook computer, run Interlnk (I don't even have to mess with CONFIG.SYS—I have MultiConfig set to offer an Interlnk optional setup), and voilà! My notebook computer now has a new drive, E. Drive E is, of course, really drive C on my desktop machine. An Xcopy command or two, and my data's transferred.

I find the new DOS online help to be of great value when I'm editing a CONFIG.SYS file. (What were those Interlnk parameters, anyway?) And while I've always had virus scanner programs around, DOS's built-in virus scanner is OK. That means that carrying DOS disks around with me will serve the virus-scanning function, allowing me to carry fewer disks.

Up through DOS 5, batch files could talk, but they couldn't listen. However, that's no longer true. There's a new batch command called CHOICE, which allows your batch files to prompt for single-character answers. Furthermore, the CHOICE command can be used in a timer role. You can use CHOICE as a kind of poor man's time activator.

Undeletion capabilities appeared in DOS 5, but DOS 6 takes undeletion a step further in reliability with a feature

called Delete Sentry. Once activated, Delete Sentry prevents DOS from actually erasing files when you issue a Del or Erase command. Instead, DOS moves the files to a hidden directory. It holds them there for a while (you can define a *while* however you like), which gives you a chance to change your mind and restore the files later.

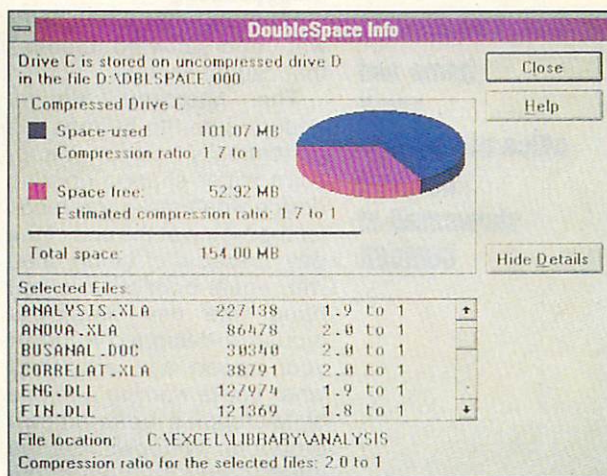
DOS 6's new features bring with them some opportunities for trouble, as is the case with all new pieces of software. In particular, you may want to be careful about installing DoubleSpace, the new disk compression routine. If you do plan to use DoubleSpace, try doing a few things to minimize the chance that you'll stumble on the path to more disk space. First, prepare your disk before installing DoubleSpace (it isn't installed automatically; you install DOS 6 and type *dblSPACE* when you're ready to start using this feature).

DoubleSpace has a hard job, so it's a good idea to make the job as easy as possible for it. Clean your disk by getting rid of any extra disk files; get rid of anything that you haven't used in a while. Then defragment your disk with the new Defrag command. Finally, do not compress the entirety of your C drive; instead, let DoubleSpace create a new drive out of the empty space on your C drive. If you find it necessary, remove some things from C, create a new drive from the empty space, and then restore the files to the new drive. Be aware that the new SMARTDrive requires that you reboot your system by executing a Ctrl-Alt-Delete keystroke combination—don't

use your reset switch! Keep that in mind, and you'll be able to get up and running with more disk space in short order.

DOS 6's MemMaker will organize your memory manager to give you more memory, and you will probably want to run it soon after installing DOS 6. But heed one word of advice: Don't run Express Set-

IBM PC or compatible, 512K RAM, floppy drive; mouse optional—\$129.95



up. Run Custom Setup instead; you'll eventually see the question *Search upper memory aggressively?* Respond by answering no; then let 'er rip! You may find yourself with more RAM than ever before. (All of a sudden, running Wing Commander with the sound effects becomes possible.)

DOS 6 is a good buy; it's an even better buy if you take a close look at some of its less publicized features. If you didn't go for this upgrade when it was offered at a special introductory price, don't feel too bad. At least you can still get it—and the new utilities bundled with it definitely justify the cost. □

MICROSOFT
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Redmond, WA
98052-6399
(800) 426-9400

Circle Reader Service Number 391

PERSONAL PRODUCTIVITY

Rosalind B. Resnick

COMDEX HIGHLIGHTS

For computer professionals worldwide, COMDEX offers a dazzling array of high-tech gadgetry. But COMDEX also features plenty for the home office user, and this spring's show in Atlanta was no exception. Stashed among the splashy displays of high-end products were lots of offerings capable of boosting productivity without busting your bank account.

Here are several new hardware and software releases that caught my eye:

The Microsoft Mouse. Reengineered to be more ergonomically correct, Microsoft's mitten-shaped pointing device won't make you reach for the Motrin at the end of the day. Capable of being used with equal comfort in either hand, the new, improved mouse is designed to boost your speed and efficiency when you're working with one of Microsoft's better-known products, Windows. Mouse mashers will also enjoy the snazzy, new software driver that minimizes mouse movement on the screen with features like Snap To, which automatically snaps the cursor to the default button in Windows' dialog boxes, and Locate, which returns the cursor to the center of the screen if you momentarily lose it. The serial and mouse port versions cost \$109.00 each; the driver alone sells for \$19.95.

PackRat 5.0. Polaris Software's award-winning personal information manager for Windows has been totally revamped, so you can spend less time figuring out how to use it and more time putting it to work. New features include customizable folders, forms, and lists; electronic mail capability; full integration with oth-

er Windows applications; macro scripts and a programming language; and SmartStart customized workspaces for lawyers, managers, and other professionals. The upgrade costs \$99; the stand-alone version had not been released in stores at press time.

HP 100LX. The latest version of Hewlett-Packard's popular palmtop PC is a savvier road warrior than the original (the HP 95LX). The HP 100LX features built-in Lotus cc:Mail Remote, data communications, and PC-software compatibility for number-crunchers on the go. It still comes in a trim black case and weighs in at 11 ounces, but the guts of the machine have been totally redesigned. It has everything from the faster CPU to the higher-resolution screen to the interactive serial port. All this for only \$749 (list price).

PagePlus 2.0 for Windows. This full-featured page layout program by Serif provides a low-cost alternative to such desktop publishing heavyweights as QuarkXPress and Aldus PageMaker. PagePlus, which retails for \$59.95, offers style sheets, floating palettes, rotation of text and objects, kerning, tracking, text filters for a variety of Windows word processors, PANTONE color selection, spot and process color separations, and support for Object Linking and Embedding (OLE). Serif also offers low-cost add-on packages such as TypePlus (\$19.95), which lets you manipulate text, and FontPack One (\$19.95), which offers 100 TrueType fonts.

TravelMate 4000E WinDX2/50. If you have some extra money burning a hole in your pocket, consider Texas Instruments' hot new 486 color notebook (\$4,999), which gives you all the power of a desktop PC in a slim 6.2-pound case. The newest TravelMate fea-

tures a brilliant 640 x 480 VGA display, a high-speed video system for lightning-fast graphics, advanced BatteryPro power management for longer battery life, and a full-travel keyboard with 12 separate function keys plus dedicated Page Up, Page Down, Home, and End keys.

Stacker Special Edition. Unwilling to let DOS 6's new DoubleSpace data compression utility go unchallenged, Stac Electronics rolled out Stacker Special Edition (\$49.95) at the show, trumpeting it as a low-cost solution for computer users leery of trusting their valuable data to a first-generation product. The new Stacker, designed only for PCs with DOS 6 already installed, replaces DoubleSpace with Stacker files and adds such features as Stackometer, which lets you monitor your hard drive's data compression ratio, and Stacker Tuner, which lets you balance speed and space. Stacker Special Edition also lets you use powerful DOS commands like Dir, Chkdsk, and Defrag on your Stacker drives.

QmodemPro 1.5 and Qmodem for Windows. Mustang Software's latest releases let you send and receive electronic mail using one integrated program regardless of the originating E-mail source. Version 1.5's new Remote Imaging Protocol (RIP) emulation allows callers to view full-screen graphics and use a mouse when connected to an online bulletin board system with RIP support. The Windows version lets you view GIF images during transfer (with magnify mode for closeups); it also supports DDE and drag-and-drop capabilities for file selection and message text.

With productivity boosters like these, you won't need to spend like a power user to get your office up to speed. □

Home and
small
office productivity
boosters
showcased at
COMDEX

CHIPS & BITS inc.

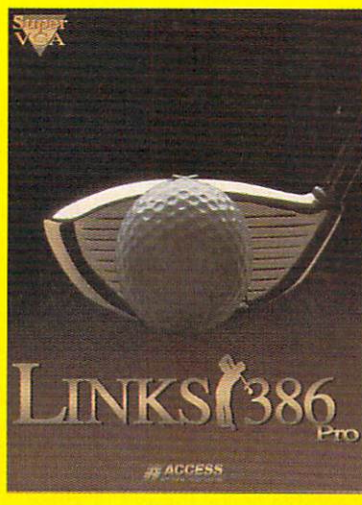
IBM MAC & AMIGA GAMES FOR LESS

Shipping to US, PR, AK, HI, APO & FPO \$4 per order. Air Mail to Canada \$6 per order. Handling \$1 per shipment.
 2 Business Day Air US \$6 per order; PR, HI \$12 1st item + \$2 ea. add'l; AK \$19 1st item + \$2 ea. add'l. Handling \$1 per shipment.
 Europe, S. America Air Mail \$19 1st item + \$6 ea. add'l. Asia, Australia, Africa, Air Mail \$25 1st item + \$6 ea. add'l. Handling \$1 per shipment.

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 Int'l 802-767-3033
 Fax 802-767-3382

IBM HARDWARE

AdLib Sound Card	\$39
Adlib Gold Sound Card	\$149
Adv. Gravis Ultrasound	\$139
Flight Stick Joystick	\$36
Flightstick Pro	\$55
Maxx Cobra Flightstick	\$54
Media Concept	\$72
Pro Audio Spectrum 16	\$175
Sound Blaster 16 ASP	\$219
Sound Blaster Deluxe	\$89
Sound Blaster Pro Dlx	\$129
Sound Galaxy BX2	\$65
Sound Galaxy NX2	\$89
Sound Galaxy NXPRO	\$125
Snd Galaxy NXPRO 16	\$169
Sound Machine	\$99
Thrustmaster FCS	\$59
Thrustmaster FCS Pro	\$99
Thrustmaster Game Card	\$27
Thrustmaster Rudder CS	\$99
Thrustmaster WCS 2	\$99
Voice Blaster	\$69



'LINKS 386 PRO' offers SUPER VGA graphics and advanced features designed for your 386 or 486. New features include computer opponent, save game option that allows you friends to play against you in an existing game. Play at Harbour Town or use the add on course disks for extra fun. **\$36**

IBM STRATEGY

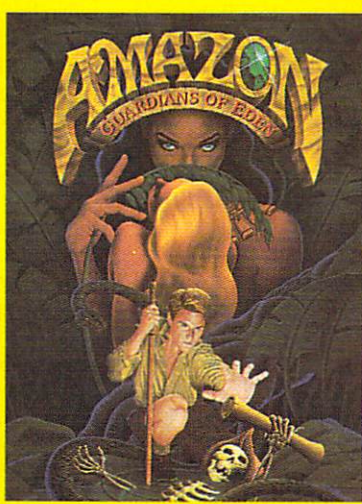
A Train	\$34
Airbucks	\$36
Armada 2525	\$29
Ashes of Empire	\$48
Battles of Destiny	\$36
Breach 3	\$36
Buzz Aldrin Race Space	\$42
Caesar	\$36
Campaign 2	\$36
Capitalist Pig WIN	\$36
Carrier Command	\$9
Carriers at War	\$37
Carriers at War 2	\$50
Castles 2	\$36
Civilization	\$32
Clash of Steel	\$42
Conquered Kingdoms	\$36
Discovery Stp Columbus	\$34
Empire Deluxe	\$37
Fantasy Empires	\$36
Fields of Glory	\$36
Gobliins 2	\$24
Lemmings 2: The Tribes	\$32
Liberty or Death	\$37
Lost Admiral	\$19
Lost Admiral Enhanced	\$44
Lost Admiral Scen Disk	\$23
Pacific Theater Ops	\$42
Paladin 2	\$34
Perfect General	\$32
Perfect General 2	\$44
Perfect General Scen 1	\$21
Perfect General Scen 2	\$23
Powermonger	\$34
Railroad Tycoon 2	\$52
Red Zone	\$32
Rules of Engagement 2	\$38
Second Conflict WIN	\$34
Seven Cities Gold 2	\$38
Shadow President	\$39
ShadowGate WIN	\$32
Sid Meir's Civil War	\$58
Siege	\$21
Sim City 2000	\$43
Soldier of Fortune	\$42
Space Hulk	\$38
Spaceward Ho! DOS/WIN	\$38
Star Control 2	\$36
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David English

COMPUTER, STATUS REPORT

When you hear Captain Picard casually call up the ship's computer on "Star Trek: The Next Generation," do you ever wonder when you'll be able to control your own computer by voice? We're a long way from having intelligent computers, but simple voice recognition software (also called speech recognition software) has finally arrived. By the time you read this, many of the popular sound cards will be shipping with some form of voice control software. In this column, I'll discuss how well this software works, what's available, and who might want to use this futuristic technology.

A number of factors determine how accurate a voice recognition program will be. These include how well the software is designed, your consistency in pronouncing the words, the number of commands that are active (especially similar-sounding words), the quality of your microphone and sound card, and the level of background noise.

Most voice programs are speaker-dependent, which means they work best when you train them to your own voice, repeating each command three or four times during an initial training session. Most programs let you save multiple command sets so that more than one person can use the program.

With a good 8- or 16-bit sound card, decent microphone, relatively quiet environment, and careful training, most of these programs are between 80 and 95 percent accurate. That means they'll only occasionally confuse one command with another or require you to repeat a command a second or third time.

How does a voice program

work? Most programs record your voice command and compare it to a database of trained commands using a pattern-matching algorithm. The program calculates a score that represents how close your voice command is to each trained command and chooses the trained command with the closest score. If the score is within the acceptable limits, the program initiates the macro that's associated with the trained command. If the score is outside the acceptable limits, the program alerts the user that it didn't understand the command. The entire process takes place almost instantly.

The first major sound card to ship with voice software was Microsoft's Windows Sound System. Its software, called Voice Pilot, includes command templates for many Windows applications. It also lets you add your own commands. Media Vision's software, called ExecuVoice, is nearly identical to Microsoft's Voice Pilot because Dragon Systems wrote both programs. Media Vision uses a newer version of the Dragon engine, but it doesn't include the ability to add additional commands (though you can launch any new application). Both ExecuVoice and a button-style microphone are included with the new Pro Audio Studio 16 sound card and in an upgrade kit for the Pro Audio Spectrum 16. Dragon also offers two voice programs through IBM. They're called IBM VoiceType Control for Windows (\$129, with microphone) and IBM VoiceType 2 (\$2,195, with a vocabulary base of 7000 words).

The voice software that Creative Labs is bundling with its sound cards was developed by Voice Processing of Cambridge, Massachusetts. It's called VoiceAssist, it supports as many as 1024 commands per application (256 active at a time), and it adds a built-in mac-

ro program. VoiceAssist is shipping with all Sound Blaster 16 sound cards. Creative Labs offers an upgrade path for current Sound Blaster 16 owners.

Covox has been making voice recognition products for many years. In addition to its own sound boards with voice support, Covox offers a program, called Voice Blaster (\$119.95), for Sound Blaster-compatible sound cards. It includes both DOS and Windows interfaces, support for Windows OLE, and a headset with a microphone and earphone. Digital Soup plans to release a basic voice program called Rover (\$129, with an introductory price of \$49) that translates voice commands into keyboard commands. And Sierra Semiconductor is providing a number of sound card manufacturers with its new hardware-based Aria Listener technology. Some of these boards are shipping with a Star Trek game from Interplay that can be voice controlled.

Who would want to use voice recognition technology? It's most appropriate for handicapped individuals, though a less-than-perfect recognition rate could cause the computer to hang occasionally. It's also appropriate for special work situations, where an employee must use his or her hands doing something else, as on a factory assembly line. For the rest of us, voice programs provide a great way to impress our friends and relatives, though I suspect few of us will use voice control every day.

Perhaps in five years or so, when the technology is perfected, you'll be able to walk down an office hall and hear people say, "Print page three" or "Send memo to George Smith." We may also have to contend with the disgruntled employee who yells, "Reformat hard drive!" as he's escorted out the front door. □

Many of us talk to our computers. Now our computers are learning to listen.

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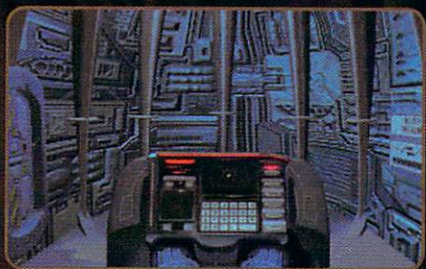
- ◆ Custom-design a variety of missions that match your skill level as you place fighters, capital ships, data pods and ejected pilots — up to 10 in each of the four action spheres.
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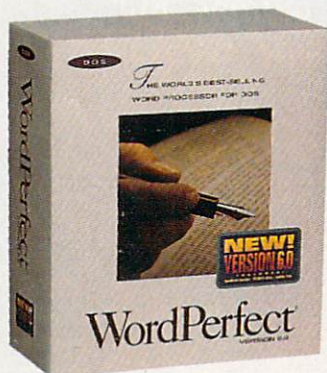
ART WORKS

Robert Bixby

FORCE MAJEURE

First, it was DOS 6; then, Windows NT. Rarely have so many exciting major programs been released in new versions at once. Summer seems to be the season for productivity software, probably because long magazine lead times make it important that editors become familiar with the programs in time for the end-of-year awards issues. But perhaps I'm just being cynical. Maybe it's just a coincidence that spring, traditionally the mating season, has become the beta

WordPerfect 6.0 for DOS is the first WordPerfect that's as friendly to first-time users as it is to power users.



season and that everyone seems to be pushing software out the door by the end of June.

In this spirit, WordPerfect has brought out the first WordPerfect word processor I can unhesitatingly recommend to a beginner.

WordPerfect 6.0 for DOS is a work of art. It has all the power of earlier versions and a friendly almost-standard interface that is not a nightmare to learn. Throw away your cheat sheets and function key stencils. All you need to operate WordPerfect 6.0 is a mouse and a passing understanding of the functioning of a word processor.

Want to send a WordPerfect document as a fax? No problem. WordPerfect has bundled a fax module to make

that simple. Want to spell-check, style-check, or look something up in the thesaurus? You're two mouse clicks away from any tool. And the macro language (finally) is simplicity itself. Forget all those tildes (no one could ever figure out how many to use or where they should go). WordPerfect 6.0 has a macro language very similar to that of WordPerfect 5.1 for Windows—a macro language that looks like a language rather than a keypress script.

Is there room in the market for an innovative, easy-to-use DOS word processor? Don't ask Borland. Don't ask WordStar International. But neither of these companies is WordPerfect, which seems to have a lock on DOS word processing. If anyone can pull it off, WordPerfect can. It has the clout, and now it has a product that will appeal to the whole DOS market (and with its new, optional graphical interface, some of the Windows market as well).

Speaking of new releases, WordPerfect's release was accompanied by Microsoft's release of Word 6.0 for DOS. Unfortunately, I haven't had the opportunity to see this product yet. I hope to obtain a review copy soon.

Obviously, Corel is intent on pulling light years ahead of its competition. It couldn't resist the temptation to amaze us again with a new CorelDRAW!

CorelDRAW! 4.0 doesn't represent a massive overhaul of last year's 3.0 version, but throughout the program you can find important improvements over last year's COMPUTE Choice award winner.

A more intuitive organization of commands, multiple pages, and a new fill feature are among the most exciting parts of CorelDRAW! itself. Each of its companion pro-

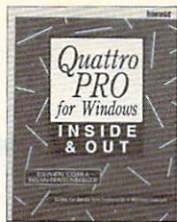
grams has also gone through an evolutionary change—adding and reorganizing in a general housekeeping effort.

One completely new feature in the package is CorelMOVE!, an AddImpact-like animation product that makes creating animated panels for your CorelSHOW! presentations much simpler.

CorelDRAW! added layers to its 3.0 release. For the 4.0 release it also added pages, which allow you to create a publication up to 999 pages long. This makes CorelDRAW! the most graphically intensive desktop publishing package ever. And it's clear from the way Corel implemented pages that this was its intention. The Page Setup dialog box allows you to select from several common desktop publishing options, including a saddle-stitched or bound book. Since CorelDRAW! already boasted a spelling checker and thesaurus, it might be all the word processor many people need. (Thank you, Corel, for quoting me in your annual report. The name is *Robert*, not *Bill*, but I'll answer to either.)

Now that the last rose has faded and we've sweltered our way through August, I'm left with one nagging question: Where was Ami Pro? It hardly seemed like summer without a new word processor from Lotus.

Have a DTP tip you'd like to share? Let me know about it by calling (900) 884-8681, extension 7010203 (sponsored by Pure Entertainment, P.O. Box 186, Hollywood, California 90078). The call will cost 95 cents per minute, you must be 18 or older, and you must use a touch-tone phone. Or write to "Art Works" in care of this magazine. And if you don't have a tip, please let me know what you're publishing, what software you're using, and how "Art Works" can help. □



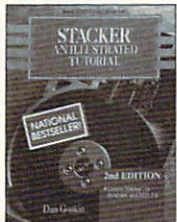
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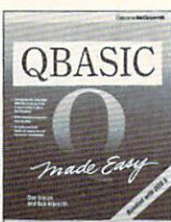
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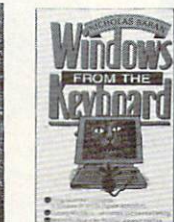
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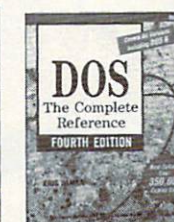
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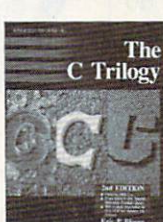
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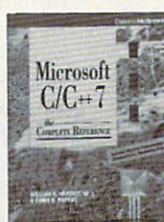
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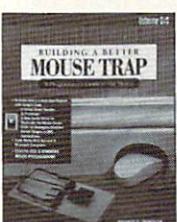
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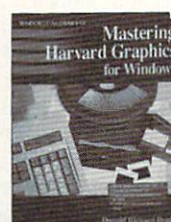
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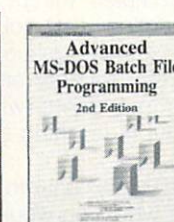
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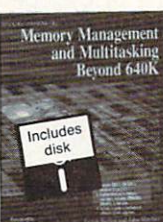
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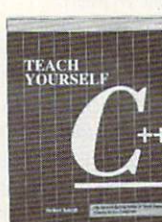
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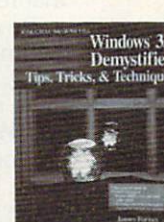
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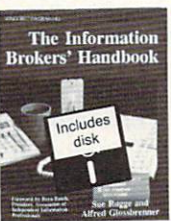
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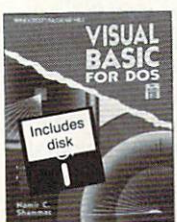
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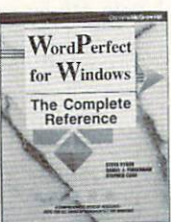
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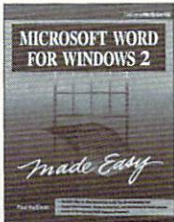
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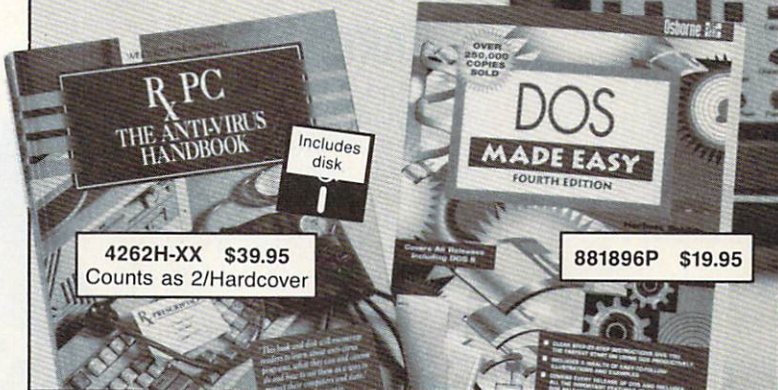


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DISCOVERY CHOICE

Research has never been as easy or entertaining as it is with this comprehensive multimedia encyclopedia, complete with animation and sound.

Stephen Levy

ENCARTA

It's Sunday evening, about 9:00, and your 12-year-old daughter is reading quietly in the family room. Suddenly, a horrified look overtakes her face. "The report!" she cries out. "It's due tomorrow!"

If you have a good reference library in your home, then you have no problem. Most of us, though, don't have the space for a comprehensive library. But we do have room for Encarta, the much-anticipated multimedia encyclopedia from Microsoft. And with access to its more than 25,000 articles, 7000 photographs, seven hours of sound, 800 maps, and nearly 100 animated sequences, your daughter just might get that report written.

Developed from the ground up as a multimedia computer encyclopedia, Encarta is much more than *Funk and Wagnalls New Encyclopedia*, on which it is based. Indeed, Microsoft has incorporated an abundance of copyrighted material that it licensed from numerous sources to create both an excellent research tool and entertaining software.

Encarta has three main parts: an encyclopedia, an atlas, and a time line. The latter two draw on the information in the encyclopedia. Microsoft has also included the game MindMaze.

And it's an intuitive, easy-to-use Windows application to boot. Want to learn about Abraham Lincoln's ability as a military leader? Easy. Simply click on the Contents button and type *lincoln*; then click on Lincoln, Abraham. In a few seconds the appropriate article appears onscreen. This



task is analogous to looking up an article in a standard encyclopedia, complete with pictures and headlines that help you find the exact information you want. This similarity ensures that most users will have little trouble learning to use Encarta.

Encarta's basic textual information is just what you would expect from a standard desktop encyclopedia: a survey of thousands of topics with varying levels of detail. It's a great place to quickly learn about a topic or to begin a research paper.

In addition to its simple Contents-button method of locating information, Encarta has a fast and efficient Find command. You simply type in the topic, concept, or words you want to explore, and Encarta gives you a list of articles that include the words you've typed. The program also allows more precise search requests: *birds and food*, *birds or food*, and similar options.

Even as a standard encyclopedia, Encarta offers more

than its printed bound cousins. And it's much more than a standard encyclopedia with great search capabilities; it's a multimedia reference guide with animation, pictures, sound, and more.

The program's information database is organized conceptually. All information falls into nine general categories, from Physical Science and Technology to Sports, Games, Hobbies, and Pets. Each of these broad conceptual groups is divided into as many as 15 specific areas, which again are broken down into scores of topics.

Once you've found a topic that interests you, Encarta takes you to the appropriate article. When reviewing the article, you'll immediately notice the small icons that appear within it. These icons indicate a related picture (which shows on the screen automatically as you scroll through the article), sound, animation, map, chart, or table. Each of these is well done, but the

ones I find most impressive are the animation and sound. This is where it is obvious that Encarta was designed for the situation instead of being simply an electronic version of the printed page.

Animation is used as a tool to help comprehension; it takes the printed word one step further to aid in understanding. With nearly 100 animated sequences in the program, it was impossible for me to watch each one. By way of illustration, I'll describe just one sequence. It shows, through animated pictures, diagrams, and audio, exactly how a television camera converts an image from the real-life object into the image you see broadcast on your screen. This is something that could not possibly be accomplished as clearly and efficiently with printed words and stagnant pictures.

Sound, including music, is also important to the Encarta experience. For instance, selecting Language Sample under the Gallery Special List group lets you hear a variety of expressions and words in dozens of different languages. Or you can hear an assortment of folk music from around the world. These are just two of many examples of how Encarta can entertain and provide a true multimedia experience without losing sight of its goal as a vast storehouse of information.

The "hot links" feature is another that shows Encarta's strengths. As you read an article, you'll notice immediately that some words are printed in another color and are underlined. These words are hot links to other articles. Click on one, and in a few seconds you'll be transferred to

the related article. You can continue to do this and explore articles in any direction and depth you want. And when you want to go back to where you've been, simply select Topic Tracker from the menu; you'll see a list of the topics for your entire session. In this list, you just click on the topic you want to return to, and there you'll be.

To assist the student who is using Encarta as a research tool, Microsoft has included several conveniences such as a dictionary and thesaurus, as well as access to Write (Windows' word processor). In addition, it's easy to print pictures, entire articles, or portions of articles. Pasting text and pictures into Write is accomplished in the same way as in any other Windows application.

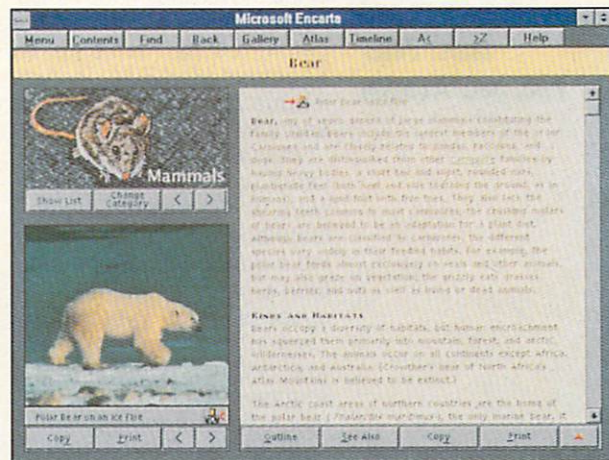
Although the encyclopedia is the heart of Encarta, the program does include two other important parts, an atlas and a time line. Selecting Timeline from the main window converts the computer monitor into a 20-foot scrolling historical time line from 15 million B.C. to the present. Using the arrows, you can scroll through time as pictures and a list of historical events move by. Click on any picture or event, and a short text box appears, giving more detail. To Microsoft's credit, this time line is a true world historical time line; it doesn't concentrate on just Western events. Although well done and interesting to explore, it, like any other time line, is limited in its value.

The third part of Encarta is the atlas. Use the pointer to move the globe to the desired world location, or click on Place Finder to locate any area of the world. The map is

filled with hot spots where the arrow pointer turns into a pointing finger. Click on any hot-spot country, sea, or continent, and the atlas zooms in to give you a closer look. Click on the name of a city or on the currently highlighted country, and you can learn more about that place.

Although Encarta is an excellent implementation of multimedia and a useful educational tool, some will say that the articles lack the depth and content of other encyclopedias. A more objective con-

IBM PC or compatible (80386 compatible), 2MB RAM (4MB recommended), VGA or SVGA, CD-ROM drive, mouse, major sound card, speakers—\$395 (\$249 for students,



cern is one that's common to most CD-ROM software: speed. You'll have to wait several seconds before Encarta retrieves information from the CD-ROM. The speed, of course, depends a lot on the access time of your CD-ROM drive and microprocessor. But on balance, Microsoft's implementation of this multimedia encyclopedia is well done with lots added to the original base encyclopedia. Encarta is well worth its price, and who knows? It might come in handy late one Sunday evening. □

Circle Reader Service Number 392

educators, and administrators, future updates slated to be under \$100 each

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GAME INSIDER

Shay Addams

POWER SIMULATIONS

Basketball fans—who have probably been playing a lot of Electronic Arts' Michael Jordan in Flight lately—may want to pick up the latest sports sim, David Robinson: NBA Action. A center for the San Antonio Spurs, Robinson worked with Park Place Productions (which did a similar Sega game) to create what is apparently the only basketball simulation with all 27 NBA teams.

The designers digitized videotapes of Robinson in action on the court, enhancing the game with a full complement of the moves that made him famous. Other features of the game, being marketed by Spectrum HoloByte, include league and season options and instant replay.

Mystery fans will prefer the latest Sierra adventure, which stars an all-new character—Gabriel Knight. Instead of using a traditional horror theme, Sierra aimed at creating suspense in the style of Hitchcock in this animated adventure. Knight is from a family of shadow hunters whose destiny is to fight the forces of evil—and what better place for hunting shadows than the French Quarter in contemporary New Orleans? The game was designed by Jane Jensen, who worked with Roberta Williams on King's Quest VI.

Electronic Arts has some incongruous titles due by September: Seal Team and Peter Pan. The former is a Vietnam-era war game that, in addition to the conventional aerial-view maps of the battle area and units, incorporates the kind of 3-D graphics usually seen in flight simulators. So, you'll encounter enemy soldiers face to face in a rice paddy, rather than just view them as icons on a map—a fresh per-

spective on war gaming that should make Seal Team attractive to a wider audience than just hard-core strategy gamers.

Peter Pan is the latest in the EA Kids line of children's games. You can alter the story by using tools, such as a paintbrush or spray can, to save Peter from a bear by turning it into a bunny.

Running a bit behind schedule, Maxis says its SimFarm, originally set for midsummer, should be on the shelves by the time you read this. Sam & Max Hit the Road is on the way from LucasArts. Even though it is based on a comic book about a team of freelance police detectives who happen to be a dog and a bunny, this graphic adventure will appeal more to adults than kids.

Ecological overtones surface in Sir-Tech's upcoming Jagged Alliance. Your goal in this strategic role-management game is to protect a species of tree from destruction by the villains. You direct up to eight characters on a remote island in the south Atlantic. Activities range from managing the harvest of the trees' valuable serum (used to fight a children's disease) to hiring mercenaries whom you control in combat. Look for it by October.

A couple of side trips this month led me to the Computer Game Developers Conference (CGDC) in Silicon Valley and to Westwood Studios in Las Vegas. The hottest round table at CGDC was the one on vehicle simulations. Novalogic's dramatic ride to the top with Comanche: Maximum Overkill has convinced many fledgling designers that simulations are the fast track to overnight success.

One hot topic at the show was the recent acquisition of ICOM Simulations (which did Deja Vu and Uninvited) by

Viacom International. A few days after the show, another major deal emerged when Sierra announced that its TSN gaming network and communications giant AT&T would work together in TSN-related projects. AT&T would pick up some of TSN's stock, while providing capital as well as other resources.

The most interesting thing about the show, however, was a spontaneous reunion of the original Infocom staff, including ZorkMaster Marc Blank, who vanished from the adventure game scene after Activision bought Infocom several years ago. Brian Moriarty, who was also with Infocom in the golden age of adventure games, revealed that he's doing his first adventure since his highly acclaimed Loom appeared three years ago. The Dig, set for this fall, involves a space shuttle crew swept away to a distant world. (LucasArts says a "very famous film director/producer" is collaborating with Moriarty on The Dig.)

In Vegas, Westwood Studios was showing Lands of Lore and Legend of Kyandia II, both set for the Christmas season. Lands of Lore is the first role-playing game Westwood has done under its own label (Westwood also designed major hits such as SSI's Eye of the Beholder). The game uses inventive storytelling sequences to round out the panoply of role-playing activities. Kyandia II is a dazzling sequel starring Zanthia, a female character who played a role in the first game. It should be out by November.

Despite previous announcements of mission disks and sequels, Westwood has elected not to do either for Dune 2. Instead, it is developing an all-new tactical game called Command and Conquer that will be out early next year. □

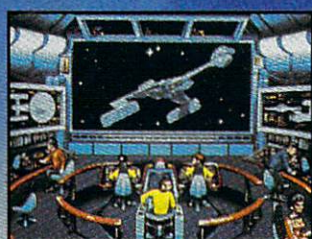
The reunion of the Zork team, more adventures and sims, Peter Pan, and Vietnam

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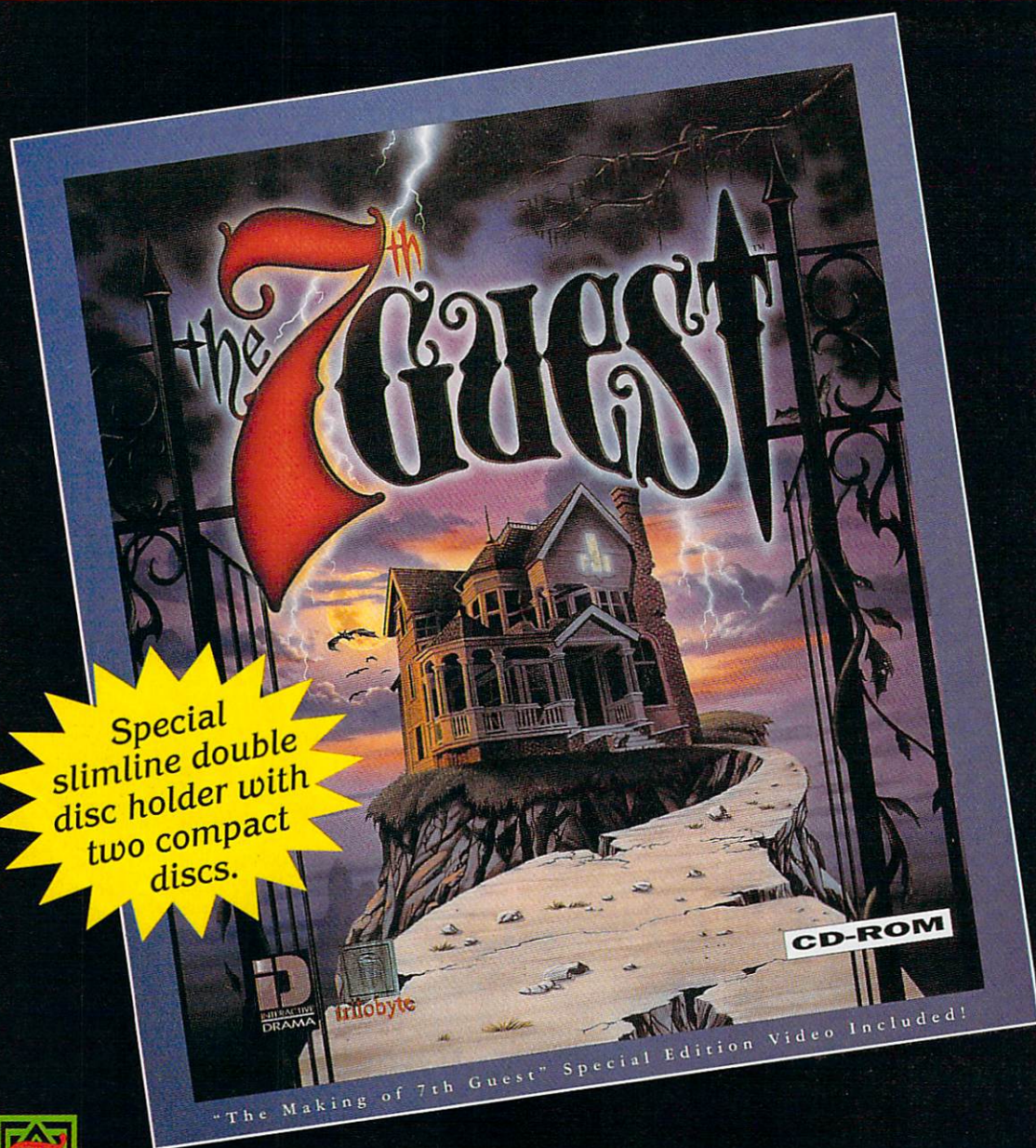
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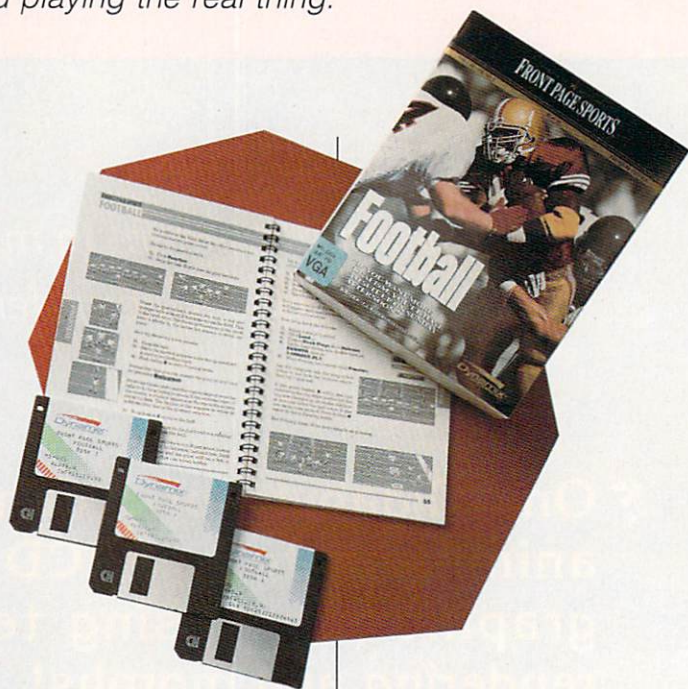
Scott A. May

FRONT PAGE SPORTS: FOOTBALL

In a blitz of cutting-edge technology, Dynamix's Front Page Sports: Football blindsides the competition and knocks them out cold. We're not talking about a playful beating here, but a crushing blow—one so powerful that it renders almost every gridiron game before it instantly obsolete. Sporting a game plan that bursts with realistic action, in-depth strategy, and statistical detail, this is a pigskin lover's dream come true.

It's hard to believe that something this good represents Dynamix's first foray into sports simulation. After only a cursory tour of the game, you'll notice the same commitment to excellence that's marked such previous bestsellers as Red Baron and Aces of the Pacific. The design turned out so well that Dynamix has slated an entire series of Front Page Sports titles.

The game divides itself into three separate, but directly connected, sections: on-field action, coaching playbook, and team management. You can compete against the computer or head to head against another player. You can choose exhibition, single season, or career league play. The game boasts full 47-man teams, complete with injured reserve, free agent pools, drafting, training camp, and trading. Seasons can be designed in one of five league sizes divided into one or two conferences with up to three divisions each. Seasons culminate with divisional championships, postseason playoffs, and a final Super Bowl-style showdown.



Almost every detail of a team's franchise can be customized by the owner: team name, nickname, head coach, jersey colors, stadium type (domed or outdoor), and nearest city. The last two options also have a direct influence on weather conditions, temperature, humidity, and precipitation, which in turn affect field conditions and player performance.

Statistical jocks will love the game's exhaustive number crunching. More than 300 stat categories are automatically compiled, updated, and displayed onscreen or printed. Detailed box scores are available during and after games, as well as match-ups from the previous week. League leader stats compare all teams and players in the league in a wide range of categories.

Players are rated from 0 to 99 in eight performance classifications. Team and player editors are available as shareware on many electronic information services, and you can find unofficial, user-created files for the 1992 NFL season.

In career leagues, the program maintains a sharp distinction between potential and actual ratings, affected by such factors as training, injuries, and aging. This attention to subtle cause and effect not only increases the realism but also deepens the game's considerable role-playing aspects. As general manager, you attempt to handpick the best players. As coach, you're responsible for working with each player to bring out everyone's best abilities. On the field, your players are compelled to excel both individually and as a team. No other computer football simulation offers such well-rounded, personal involvement with every phase of the game.

Strategic-minded players will revel in the game's extraordinary playbook editor—which is without doubt the most comprehensive and intuitive yet seen. More than 200 stock plays are included, divided among standard offensive and defensive formations. Utilizing a CAD-style point-and-click drawing interface, you

can easily alter any of these predesigned plays or create your own. Movement paths are represented by lines, ending with or segmented by logic boxes. Assembled with simple menu-driven text commands, logic boxes are instructional scripts that tell each player how to react as a play unfolds. Instructions may be absolute, causing an action to be performed regardless of circumstances, or conditional, allowing players to react logically to each unique situation.

Logic boxes offer incredible control over every nuance of play. Defensive players can be "taught" to adopt an aggressive, conservative, or balanced stance. Offensive and defensive plays can be practiced with or without opposition. Try experimental pass routes against different formations, or select a killer offensive attack and mold a defense to stop it. Much of the game's appeal comes from testing, dissecting, and fine-tuning your plays into gridiron ballets of power and beauty.

More than 8000 frames of animation were used to create the astonishingly lifelike player movement, digitized from human models with a technique called rotoscoping. Rendered from a 256-color VGA palette, the graphics are bright and expressive, augmented with bone-crushing sound effects and crisp digitized speech.

Although Dynamix recommends an 80386SX as its minimum system requirement, the game performs better on a 33-MHz 80386, and it positively smokes on an 80486. On slower machines, the players move as if they're running underwater. Luckily, most sound and graphic effects can be

selectively turned off, speeding up the action considerably. The game also makes excellent use of expanded memory for reduced disk access.

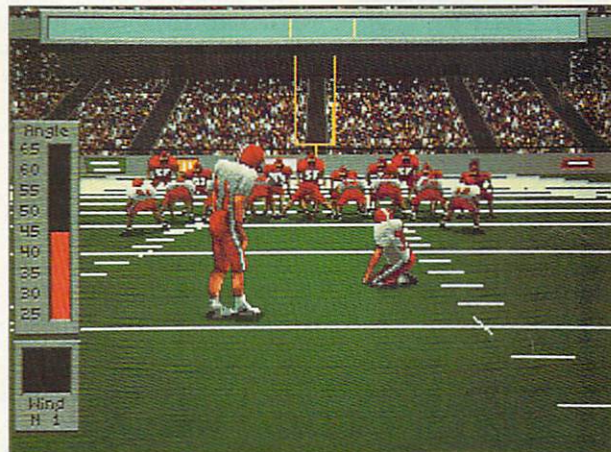
The on-field action is fantastic. Three skill levels offer you full or partial control of the action and coaching duties. The game supports keyboard, mouse, and dual joysticks. The joysticks option is definitely preferred. Arcade controls are fast and reliable. Your view of the action can be changed either before or during play to one of nine fixed camera positions. These views, as well as a free-floating camera, also contribute to the game's extraordinary instant-replay system. Using standard VCR-style controls, you can easily view, edit, and save pivotal plays as a highlight film.

Like all other great works, this game has its share of problems and shortcomings. Entire playbooks must be memorized by their often cryptic eight-character abbreviations. Unfortunately, there's no provision for printing actual play diagrams to create a real coach's playbook. Missing play options include improvised hand-offs, laterals, and shovel passes, but these require realtime action that would admittedly be difficult to program. An option for shorter quarter lengths (five or ten minutes) would also add zest to pure arcade contests.

Another major inconvenience occurs when you simulate a series of weekly league games. For realism's sake, the program simulates every game—sans graphics—instead of quickly generating results. This means agonizingly long periods of computer inactivity. On a 25-MHz 80386, for

example, the average computer-simulated game takes 11 minutes. Multiply this by the full 28-team weekly schedule, and you're looking at 2-3 hours of nonstop number crunching and hard drive activity. On a 66-MHz 80486, this figure drops to about 30 minutes. Regardless, players should be given the option for a quick resolve. Adding insult to injury, the only way to stop the computer simulation is to exit to DOS or reboot.

IBM PC or compatible (80386SX compatible), 640K RAM (2MB expanded memory recommended), DOS 5 or higher, 256-color VGA, hard drive, high-density floppy drive; joystick(s) or mouse strongly



Despite these problems, a big stadium wave is in order for Dynamix's support team, especially those folks involved with the game's outstanding documentation. The indexed manual brims with illustrated examples, playbook tutorials, and suggested reading. The folks at Dynamix also earn high marks for their quick response to customer-reported bugs and suggested improvements.

Front Page Sports: Football kicks our perception of computer sports simulations into another dimension. The only thing that gets better than this requires a uniform. □

recommended, supports Sound Blaster, Ad Lib, Thunder Board, PAS Plus/16, Roland MT-32, and compatible sound cards—\$69.95

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GAMEPLAY

Paul C. Schuytema

WHAT COST FREEDOM?

MECC has been at the forefront of educational software development for years, paying special attention to classroom-based games. Its Oregon Trail is a classic—and is still a vibrant educational tool after more than a dozen years.

Last fall MECC released Freedom!, another historical simulation. In it, children in grades 5–8 assume the role of a slave attempting to escape to freedom through the Underground Railroad.

The game's historical detail was provided by African-American scholar Kamau Sebabu Kambui. Freedom! attempts to recreate the experience of the antebellum period in the eastern U.S.

Players choose a character who has certain skills, such as literacy (though usually the character is illiterate). Children, as slaves, have the option to speak with elders on the plantation to glean necessary advice such as "Moss grows on the north side of trees."

Play proceeds as children attempt to travel from safe house to safe house, learning survival and communication skills plus resource management. One of the game's most exciting aspects is the way it handles illiteracy: If a slave can't read, then any notes or signs encountered appear on-screen as indecipherable symbols. Children can learn to match symbols to see if they're on the right track.

Freedom! hit classrooms last fall. By the beginning of 1993, it had been pulled from the market and all its field licenses had been revoked. Why? Freedom!, as a simulation, opens an interesting Pandora's box of questions.

A parents' group in Merrillville, Indiana, objected to sev-

eral prominent features of the game. After meeting with the group, Kambui, and an NAACP representative, MECC decided that the parents' objections were of sufficient magnitude to justify pulling it from the market.

Paulette Davis, spokesperson for the parents' group, told me that Freedom!, introduced into the school's open computer lab, was offered as something students could explore with their free time. No curriculum was attached.

Freedom! attempts to recreate the attitudes, prejudices, and speaking patterns of the times. Davis felt that the slaves' uneducated, dialect-heavy speaking manner presented the wrong impression of African-Americans to a predominately white student body. She felt that the school's few African-American students were being alienated and misrepresented.

Davis also felt that since the game's outcome is either winning freedom or losing by being killed or recaptured, and since it's a very challenging simulation, children with strong computer skills had a serious advantage. Consequently, other students were not receiving healthy feedback or positive reinforcement.

Perhaps her strongest objection—that African-American history doesn't begin with slavery, but in the kingdoms of Africa—is not so much a fault of the game as it is a fault of historical curricula in general. For Davis's group, Freedom! trivialized and "Nintendoized" a traumatic and difficult period. Thus, it sent the wrong messages to students.

On the other side of the argument, Helen Cartier, librarian and computer educator at the Hoover Elementary School in Wisconsin, was shocked when MECC pulled her school's licenses for Freedom!. She had it installed on

over 30 computers in fifth- and sixth-grade classrooms.

In her experience, Freedom! provided an exciting vehicle that enabled students to understand some of the challenges that African-Americans faced when fleeing captivity. Her students reacted better than she had hoped to the game's handling of illiteracy. She found them challenged to learn new problem-solving skills and excited enough to seek more information.

For Cartier and other teachers across the country, Freedom! was an exciting addition to their curriculum, presenting the time's struggles, prejudices, dialect, and history in an interactive manner that challenged students to think and learn, not just to memorize.

Cartier feels that the parents in Merrillville had the right motivation: to enhance awareness of and education about the African-American experience. But by initiating the action that pulled the game, they actually hurt their larger cause by depriving students of a valuable educational tool.

The question is, While prejudice, ignorance, and cultural ethnocentrism remain with us, how should we approach games and simulations such as Freedom!, which portray a time when the attitudes we're trying to eradicate were the norm? Do they trivialize the struggle and further ingrain the long-standing attitudes, or do they provide an exciting, kid-friendly vehicle with which to educate and inform?

If there's one thing that both sides adamantly agree upon, it's that a game such as Freedom! should not exist in a vacuum. It's up to parents, teachers, and school systems to ensure that a solid curriculum supports such a product. Only then will its educational merit truly come through. □

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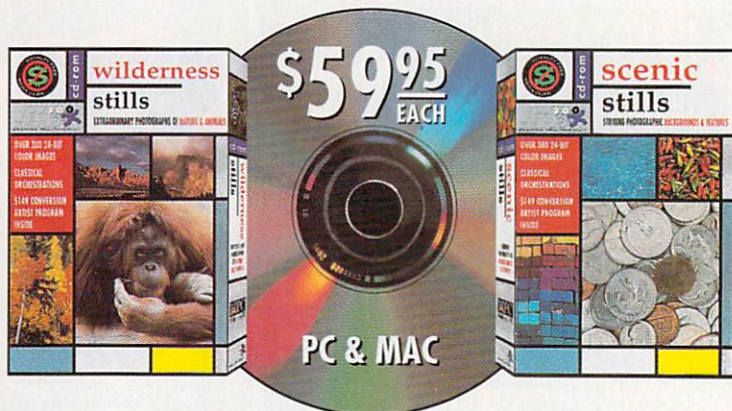
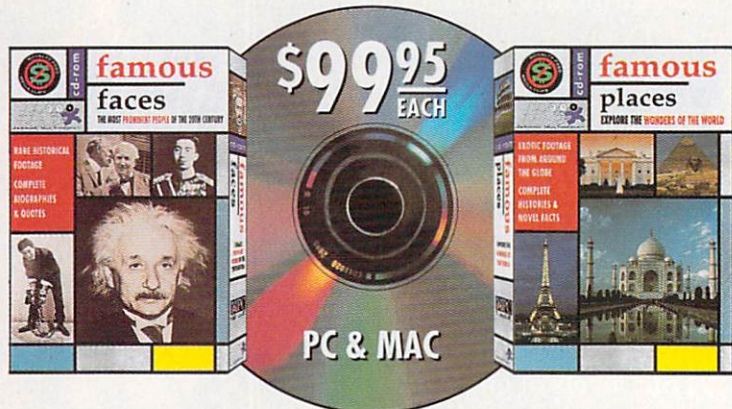
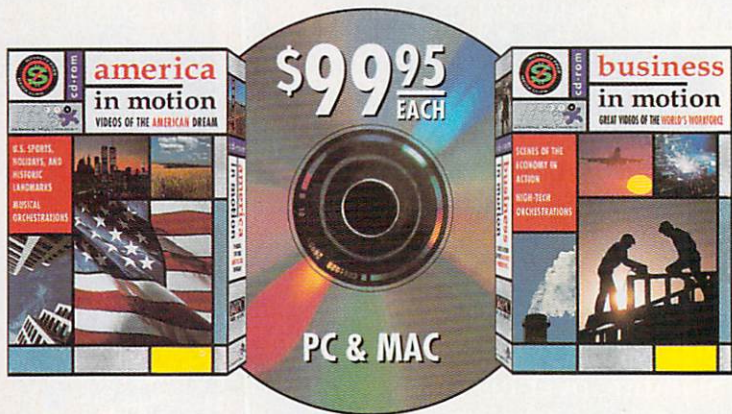
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PUSHING FUN TO THE LIMIT



These days, programs have to provide depth, power, and value—going far beyond great entertainment—to keep children interested.

By Carol Ellison

Have you heard the news about kids' games? They're not just for kids anymore. They're bigger, better, and more challenging than ever. And they're pushing the high end of computing technology. If you want to give your children the best software that the market has to offer—the programs with fast-paced action, hi-res animation, and concert-quality sound—you're looking at an upgrade akin to what it takes to run Windows apps.

Gone are the days of trickle-down economics in home computer budgets. No longer can you simply move your PC into the playroom when you trade up to a heftier model for yourself. If you still think the kids will be satisfied with any system you pass along, think again.

The Games Platform

"I finally had to turn my 386 with the 300MB hard drive over to my kids," a programmer in California confided. "I got tired of them pirating my VGA monitor and hounding me to uninstall software so they could install new programs; 120MB wasn't enough. Now, the kids have a better system than I do. Life's just easier that way."

It's also more fun. And unless you're a programmer, it's unlikely that your children's software will require that much disk space. Still, plan on allowing 6MB–8MB per game if you want to install programs packed with sound and animation.

The newest and niftiest programs on the market make use of multimedia effects that raise the bar on hardware requirements. And we're not simply talking about the programs on CD-ROM. True, Sierra On-Line and Brøderbund, two leaders in children's software, have pioneered CD-ROM-based games: Sierra by taking its classic Mixed-Up Mother Goose to disk three years ago and Brøderbund with its more recent series of interactive Living Books. But these companies and others now are delivering high-quality multimedia programs that you can run directly from your hard disk. If, that is, you have the PC power for it.

Arnold Waldstein, director of marketing for Creative Labs, which makes the popular and widely supported Sound Blaster cards, recommends a PC with an 80386 or higher processor, at least 2MB of memory, Windows 3.1, and no less than a 30MB hard drive as an entry point to the world of children's entertainment software.

VGA has become the video standard for the latest children's games. And virtually all new games—certainly the best ones—require a sound card for full enjoyment. Plus, many chil-

dren's programs consume hard disk space soaring into the megabytes.

Binary Zoo's animated romp through the Smithsonian Institution, Smithsonian Mystery at the Museums, requires 5MB of disk space to accommodate the games and scanned art images from the real museum. And its Wild Science Arcade (which presents kids with wacky exercises to illustrate concepts like the force of gravity) even requires expanded memory.

Squeeze Out Power

Superior compression techniques allow developers like Knowledge Adventure's Bill Gross to imbue that company's latest release, The Tale of Peter Rabbit Talking Storybook, with sound, action, and interactive hyper-

Creativity Hits: Fun for Everyone

Pick a color, any color. Then, pick a background, one that explodes with starbursts. Mix it with thundering applause and a beat to rock a coliseum. Add some reverb, and loop the routine so the end links to the beginning and it plays and plays and . . .

This little scenario is what plays out in Rock and Bach Studio. The software not only turns kids into budding MTV producers but also gives them something new to work with every time they sit down at the PC.

Programs like Rock and Bach, Davidson's Kid Works 2, Brøderbund's Kid Pix and Print Shop Deluxe, MECC's Storybook Weaver, and the Disney print kits aren't just games. They're tools—programs that a kid can come back to when there's a project to complete. They're as versatile as adult desktop publishing programs, word processors, or draw and paint software. In fact, Kid Pix and Kid Works 2 put in a little of each of these applications and throw in animation and sound effects to boot.

These programs are the electronic equivalent of finger paints, crayons, and chemistry sets. They're limited only by the imagination. And two minds often being better than one, these games are also better suited to group play than ones that challenge kids individually to attain a higher score.

The beauty of these programs is that they grow with the children. Adults who want to include a family newsletter in a greeting card or produce their own announcements will even enjoy using them.

textlike capabilities. The software reads the complete text of the storybook aloud to an original musical score, and children can explore illustrative elements in the story. Best of all, it runs from your hard disk and uses only 3MB of space. These new compression techniques are marvels, but don't expect them to shrink the size of software. Developers are using these newfound schemes to pack more sound and graphics into their already sizable programs.

Superior compression schemes are what make The Sierra Network's online gaming service possible. The Sierra Network lets you and your children pit your skills at everything from poker to Boogers (a children's game, as you can tell from its name) against those of gamers across the country. The games actually reside on your hard disk; they consume a whopping 8MB. But because the games run locally on your system as part of the front-end software that accesses the network, the graphics achieve near-VGA quality, and animation runs at a reasonable speed.

Voice! Orchestra!

Strides in audio technology are producing far more realistic sounds. New, quicker 16-bit sound cards, such as Creative Labs' \$99 Sound Blaster Pro Deluxe, are downward compatible with software written for the old 8-bit cards and are able to take advantage of new technologies that produce more natural sounds. The company's new Sound Blaster 16, scheduled to list for \$279 and ship by the time you read this, will combine 16-bit sound quality, downward compatibility, and upward expandability in a bundle that includes a variety of games, applications, and voice recognition software.

The new 16-bit Sound Blaster supports both FM (synthesized) sound and sampled sound, which is recorded and digitized. A new technology called wavetable synthesis merges the two to produce a wider, more even range of tones. This makes your PC's sound capabilities leap to a new range of fidelity that can produce everything from the high notes of a soprano's aria to the chirp of crickets on a hot summer's night, a Mozart concerto, or a stentorian monologue.

Voice recognition is the newest multimedia frontier. Voice recognition will probably first make a significant appearance in children's software in the form of verbally entering players' names so that the games programs can speak them back at appropriate moments. Creative Labs' bundled

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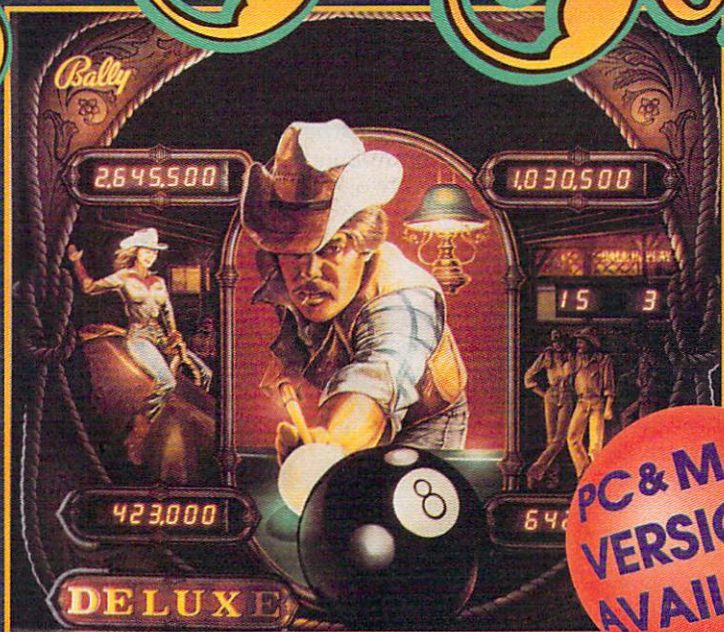
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Circle Reader Service Number 157

voice recognition software is called Voice Assist, from Voice Processing Corporation (VPC). Voice Assist comes trained to recognize 256 words, including those on familiar Windows menus. Understandably, it initially will be most useful for Windows-based software.

At this writing, voice recognition has not made an appearance in children's games. However, at the Computer Game Developers Conference last spring, attention focused on its potential. With voice recognition and a bit of artificial intelligence (AI) built into the software, and with a sound card, speakers, and a microphone installed, a computer will be able to interact with a child in more natural ways. The child will be able to speak commands instead of entering them from the keyboard.

Creative Labs, in testing Voice Assist, actually wrote an AI program that took orders for pizza and assembled the pizza, with the user's choice of pepperoni, extra cheese, onions, or anchovies, onscreen as an order was entered verbally.

Sound is important in entertaining educational games. Unless you have a sound card, you simply can't hear ground control monitoring Carmen Sandiego's moves through the solar system in *Where in Space Is Carmen Sandiego?*, Brøderbund's latest entry in its runaway hit mystery series. And

unless your hard disk can accommodate the 8MB the program consumes, you won't even be able to install it.

And what's a music video without sound and animated effects? Binary Zoo's *Rock and Bach Studio* lets kids stage music and light shows, à la animated music videos, right there on the monitor. It, too, requires a sound card—not to mention a large amount of disk space to hold the sound and animation files that make video creation possible. If you let your children save their videos, your disk needs start rising incrementally.

The Man Becomes the Child

The latest games software from companies like Brøderbund, Sierra (and The Sierra Network), Davidson & Associates, and Binary Zoo combine fun and challenges with state-of-the-art technology that the whole family will enjoy.

What's more, these new technologies are remarkably interactive, allowing children young and old to interact with the computer, with one another in multiplayer games, and even with the masses in online interactive game arenas like The Sierra Network and America Online's *Neverwinter Nights* adventure game.

You'll still find software with age ratings on the box, but a number of companies are following the lead of

Davidson. Last fall that company erased the age rating on its Davidson's *Kid Works 2*, a paint and publishing program packed with animation and sound effects, and began advertising the package "for kids of all ages."

Davidson's *Kid Works 2* is just one of the multimedia products that populate the top of the children's software charts. It's a creativity kit that's sold with a companion clip art library, called *Kid Pictures*. *Kid Pictures* can also be used with the competition, Brøderbund's runaway paint hit, *Kid Pix*. These creative kits make wackiness the norm. The sight gags and sound bloopers you can build into pictures and stories are limited only by your imagination—oops! We meant to say *your kids'* imaginations, of course!

If you haven't perused the software store shelves lately, take time to do so. You'll find that these incredible children's packages are affordable. But be forewarned: Once you take these programs home, you'll probably have to relinquish your computer to your kids. That is, until you try out some of the programs yourself. Indeed, they aren't just for kids anymore.

Carol Ellison is coauthor of the book Parents, Kids, & Computers (Random House). Her column "Of Mice & Kids" appears in the Education Review of the Washington Post. □

Shopper's Market

Neverwinter Nights—\$14.95 (software), \$9.75/month (5 hours)

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Davidson's Kid Works 2—\$59.95

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64/128 VIEW

COMPUTE says goodbye to Amiga Resource, but Gazette will continue—with your help!

Tom Netsel

There's good news and bad news this month. Let's get the depressing item out of the way and then finish on a couple of upbeat notes.

The bad news is that this issue marks the final edition of Amiga Resource. As Gazette is available for 64 and 128 users, Amiga Resource was available to Amiga subscribers as a special section in COMPUTE. Subscribers to COMPUTE's multiedition received both the Amiga and Gazette sections.

What began in 1988 as a sporadic buyer's guide for Amiga products evolved into a quarterly publication in the spring of 1989. Reader response was enthusiastic, and Amiga Resource became a bimonthly publication less than a year later. In the summer of 1990, General Media bought COMPUTE Publications and relaunched the magazines in their present format. Amiga Resource went monthly with Denny Atkin as editor.

In a computer market dominated by IBM and clones, Amiga Resource and Gazette provided coverage for a dedicated core of Commodore users. As long as each section had a sufficient subscribers, publication could continue. Those numbers are no longer there for Amiga Resource.

That's the bad news. The good news is that Gazette continues. Thanks to your support, we still have enough subscribers to warrant the time, effort, and expense of turning out a 40-page section devoted to an 11-year-old computer. How long Gazette continues is up to you readers. If you re-

new your subscription and encourage fellow Commodore owners to subscribe, then we'll continue. If you feel it's time for Gazette to call it quits, let your subscription lapse.

Naturally, I hope you'll continue supporting Gazette as you've done for the past ten years. Commodore users from around the world continue to produce amazing programs for the magazine and its companion disk. And after more than a decade of publishing, our columnists and writers still haven't exhausted their editorial possibilities. I've got some great programs and articles that I want to share with you, and it'd be a shame to waste all this valuable information. I hope I can count on your continuing support.

Here's some more good news. Creative Micro Designs (CMD) is now handling a lot more Commodore software and hardware. It recently purchased all of the products that RUN magazine once offered through TechMedia.

CMD has confirmed that it is taking orders, and a new catalog of products that include the GEOS Companion disks, Productivity Pak, modems, and heavy-duty power supplies should be available by the time you read this.

CMD is searching for more Commodore products from other firms as well. The Massachusetts-based company wants to become an even greater resource for Commodore owners by offering a wider range of software and hard-to-find products. Keep up the good work, CMD! □

GAZETTE

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Printers are practically a requirement for any well-equipped computer system. Through the use of an interface, a 64 or 128 can connect to almost any printer, but the dot-matrix is still the choice of most Commodore users.

PRINTER

When the 64 was introduced 11 years ago, its users were severely restricted in their selection of printers. One of the reasons for this was because their computer didn't come with an industry standard Centronics parallel or RS-232 serial port.

Printers from Commodore were the only game in town for some years, and they were generally high-priced and of poor quality. Most third-party printers came equipped with Centronics parallel ports (RS-232 ports were available as an option), but they were incompatible with Commodore hardware. Luckily for us users, a number of companies produced printer interfaces that enabled us to use these third-party printers with our Commodores.

transparent mode. This means that the output from your program is sent unaltered to the printer. In this case, the interface simply takes the Commodore serial data bit by bit and sends the information as eight parallel data bits. It also sends along a few handshake signals, which the printer needs in order to communicate with your computer. More about these later.

Then There's PETSCII

Not only is the 64's hardware nonstandard, but the numerical codes that it uses to represent characters is also nonstandard. Practically all printers use what is known as the ASCII standard, where a code value of 65 stands for an uppercase letter A. The 64, however, in-

POTPPOURRI

These days, most any printer, be it dot-matrix, ink jet, or laser, can be connected to a Commodore through one of these printer interfaces. Although laser printers have experienced dramatic price reductions, most Commodore users still opt for dot-matrix printers, which offer excellent quality at affordable prices.

In the Mode

Getting back to the interface, these devices take the nonstandard Commodore serial port signal and make it look like a Centronics-compatible signal, which most third-party printers can recognize. Interfaces typically allow several modes of operation. One mode always is the downwardly compatible 1525-emulation mode. This mode uses Commodore graphic characters stored in the interface ROM and blocks all non-Commodore printer codes from reaching the printer. This means that a fancy printer is essentially downgraded into acting like a 1525. This mode is useful only with ancient programs that don't support any other printer.

Printer interfaces also allow you to use all the features of your printer through what is aptly named

terprets an ASCII value of 65 as a lowercase a.

For the benefit of the printer—and your printouts—the interface translates the Commodore codes (sometimes called PETSCII or CBMSII) that flow from the computer into ASCII codes. Some 64 word processors generate ASCII output directly, and these work very well if you set the interface to its transparent mode. Even if your 64 program sends true ASCII code, you still need the interface in order to supply the correct electrical signals for the printer.

Interfaces also allow you to print program listings in several ways. The embedded graphic characters and control codes that represent color changes, cursor movements, or screen-clearing functions that you see when you list a program on your monitor can be made to appear in the printed listing as graphic characters, key combinations, or a numerical code.

Some interfaces also have a hex-dump mode in which the hexadecimal values of all the characters that are sent by the computer are printed. This comes in handy when you're debugging should a program hang up the printer by sending an unwanted control char-

BY RANJAN BOSE

acter. Since many printers can be set to work in this mode, you probably won't miss it if your interface lacks a hex mode.

Interfaces also allow you to turn linefeeds on or off as needed. This is another feature that's present on many of today's printers.

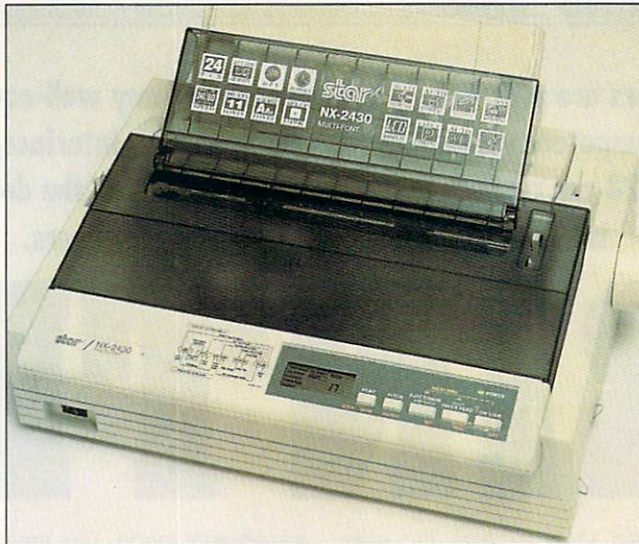
Most printer interfaces come with a buffer. This is memory that is resident outside the computer. It can be as tiny as 128 bytes or as large as 32K. Rather than waiting around for the printer to accept the printout information, the computer dumps it to the buffer. The computer is free to work on other chores, and the buffer hangs onto the information until the printer is ready to print it. The bigger the buffer, the sooner it frees the computer when you have a large file to print.

Making Contact

The printer and computer first establish a common time frame (handshake) by using a strobe signal, which is a volley of very fast and regularly occurring electric pulses. The computer then waits for the printer to signal its availability with a high acknowledge signal or a low busy signal. On receiving the appropriate signal, the computer sends the information that is to be printed. These characters, which are nothing more than electrical pulses, get sent at a rate of 400-600 characters per second.

Few printers can handle information this quickly. Since most are limited to printing at a much slower rate, typically 40-150 characters per second, the characters coming from the computer are stored in buffers, which may be in the printer or in the interface. When the buffers are full, the computer receives a signal to stop sending data. From that moment, the computer waits until the printer catches up and signals that it's ready for more data.

In a system with a tiny buffer, this waiting game can occur every few sec-



With a printer interface, you can connect your 64 or 128 to practically any printer, such as these multifont models from Star Micronics.

onds until everything has been printed. If a big buffer is available, then the computer can send a large amount of data before it is interrupted. After sending the last packet of data, the computer becomes available for further use.

A Dip into History

Modern-day dot-matrix printers descend from line printers, dinosaurs that were used long ago when video monitors were prohibitively expensive. By firing a single column of six to eight pins as the printhead moved across the page, the line printer was able to reproduce characters and graphic shapes. Its printing speed was comparable with present standards, but the quality was terrible. The dots that made up the printout were visible from a mile away.

For those requiring better print quality, the only recourse was to acquire a heavy, expensive, noisy, and slow daisywheel printer. The daisywheel has all but disappeared with the advent of laser and ink-jet printers. (These latter printers still employ the dot-matrix method of printing, but they employ very tiny dots.)

Still on the Dot

Despite the poor quality of their early printouts, dot-matrix printers have remained popular. They've survived primarily by a fierce reduction in price, aided by an increase in features and a boost in print quality. In an effort to keep their customers and attract new ones, printer companies have increased the number of pins in the printhead, added color, and offered improved paper handling.

As lasers and ink jets continue to drop in price, it's quite possible that some day people will find it economical to have a laser printer for letter quality printouts and keep a dot-matrix printer on hand for printing multipart forms. Forms are beyond the capability of the mighty laser printer right now because it doesn't use impact technology.

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The print quality on today's dot-matrix printers is far from bad. Even 9-pin printers can produce near letter quality printouts by using multiple passes. This does affect printing speed, however. The printing speed in NLQ mode is about 30-50 percent slower than when printing in draft mode.

You may experience some reduction in print quality when using fanfold paper. Since the printer grips fanfold paper less firmly than friction-fed single sheets, you often get a line or two of text with jagged characters because of unavoidable paper movement between the multiple passes of the printhead. A 24-pin printhead avoids this problem by printing LQ characters in a single pass. Also, by using a denser dot-matrix (up to 30 x 48 dots per character as opposed to 18 x 18 on a 9-pin printer), a 24-pin printer produces letters that are better shaped with smoother curves than its 9-pin cousin. It generally prints faster, too.

Some Useful Features

As I mentioned earlier, prices of dot-matrix printers have dropped dramatically over the years, and to make them even more appealing, manufacturers have piled on the features. Here are a few that can make your printing sessions more enjoyable.

Paper parking. In older printers, at any given instant, you were limited to using either fanfold paper or single sheets. If you had fanfold paper in the printer and wanted to print on letterhead or other single-sheet stock, you had to remove the fanfold paper. When you'd finished with the single sheets, you then had to go through the whole tedious procedure of reloading and aligning the fanfold paper.

In newer printers, you don't have to remove fanfold paper in order to use single sheets. It can be "parked" out of the way while single sheets are used. When you're ready to switch back to fanfold, it can be brought back into position by moving a lever or pressing a switch.

In some printers, the parked paper is held in a curved shape. If the paper is left for a day or two like this, the curl can cause the paper to jam or at least

PRINTER LIFESAVERS

Dot-matrix printers typically need minimal care, but here are a few things to keep them online even longer.

- Use the best quality paper. Cheap paper sheds a lot of minute particles. This paper dust can mix with lubricants to form a dough that can clog moving parts.
- Clean the printer by lightly vacuuming, taking care not to touch ICs, cables, or other electronic parts. Static electricity generated during vacuuming can be damaging.
- Smoking, eating, and drinking near computer equipment is like playing Russian roulette! You'll win most of the time, but you'll remember the time you lose.
- Once or twice a year, depending on usage, clean the guide rail supporting the print head with a dry lint-free cloth. Lubricate the rail sparingly with a very light oil.
- Once a year, clean the rubber platen and paper bail rollers with ethanol (or special cleaning solution available for this purpose from office supply stores) and with a rubber-conditioning compound.
- If the print head becomes dirty and begins to smudge printouts, remove the ribbon and then use a strip of lint-free wipes, moistened in alcohol to gently floss the print head and the ribbon mask (the plastic or metal frame that lies between the print head and the paper).
- Never use a ribbon with a weak area, one that appears as a translucent patch when the ribbon is viewed against light. Don't use one that has an actual tear in it as this could snag the print head pins.
- Never use the printer for extended periods of time. Most printers have a detector that shuts the printer down automatically when the print head overheats. When printing more than a few pages, it's wise to leave the cover open for promoting ventilation.
- Re-inking a printer ribbon might appeal to the Scrooge in you, but it could cost you the print head! For proper operation, ribbons need to have the right amount of ink and lubricant. Darker printing ribbons may look good on paper, but they generally have less lubricants. A cheap ribbon that's short on lubricant could rip and catch the delicate pins, costing you an expensive print head replacement.

give an unsightly top page on the next document that's printed.

Other printers hold the parked paper flat and don't have this curly problem. In fact, even when using fanfold paper, it's a good practice to park the paper at the end of each session. Paper left wrapped around the platen can definitely develop a curl, giving you a top page that looks unruly.

Zero-inch tear off. With earlier printers equipped with pull-tractors, when you finished printing a document, you normally had to advance the fanfold, tear off the printed pages, and then use friction feed to print the first half of the next page until it caught the tractor sprockets. You then took the printer offline, engaged the paper in the sprockets properly, disengaged the friction-feed, and printed the rest. It was as painful a procedure as it sounds.

This procedure was prone to numerous frustrating problems, espe-

cially when several people used the same printer. It was very easy to have misaligned sprocket holes. Often, someone would forget to disengage the friction setting after loading the fanfold. This situation usually occurred when you went for a cup of coffee after starting to print your 20-page document.

The other option was to use the fanfold from the beginning and to discard the blank top page. The trees would probably like to say something about this wasteful procedure.

In newer printers equipped with pushfeeds, it's possible to advance the page after printing, tear off the last printed page, and then retract the paper to the top printing position. Rather than going through the contortions outlined earlier, all you have to do is press a switch to move the paper.

Improved paper handling. Newer impact dot-matrix printers allow a greater adjustment of the gap between the printhead and the platen, thereby permitting the use of thicker forms. In general, paper handling is more positive, precise, and predictable on newer printers than on those from even a few years ago. The improvement makes it much easier to print envelopes, multipart

forms, and labels.

Scalable fonts. No matter how good a regular font looks (even on 24-pin printers), the jaggies show up when you print them in double width or double height. Scalable fonts smooth out the jaggies. With them, new printers can print out slick-looking characters over a wide range of sizes. A few printers have scalable fonts built in, while others print those with the help of special software.

Quiet operation. While improved print quality attracts users, the noise that dot-matrix printers generate turns quite a few prospective users away. A typical workhorse, churning out 40-80 cps in letter quality mode, is noisy enough to render nearby conversation impossible. Printer hoods can bring the noise down considerably, but they take away easy access to the printer's controls and paper.

Most new printers come with a quiet

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mode, which reduces the printing noise by slowing down the printing speed. Panasonic, followed by others, has gone beyond this technique to equip newer printers with quieter moving parts and added insulation. There's even a superquiet mode that alters the method of firing pins in two passes. Even at regular speeds, these printers are supposed to produce about $\frac{1}{8}$ as much noise as earlier printers.

Color. Practically all self-respecting dot-matrix printer manufacturers now have at least one model that prints in color. Color printers use a ribbon with tracks of colored ink and a motor which moves the ribbon up and down to bring one of the (usually) four-colored bands against the printing pins. By printing in one color and then reprinting over it in another color, up to seven colors can be generated.

Since accurate registration of superimposed characters is essential, most of the printers become unidirectional when printing in color. The resultant output is slower than when the printer is printing with a black ribbon, but the only other alternative would be to purchase an ink jet or

color laser costing many times more.

Color intensity varies from printer to printer, and one band of color in the ribbons usually dries out faster than the others, leading to shifts in hue over a period of use. Colored ribbons are generally two to three times more expensive than black ribbon, and they have a shorter life.

Improved printhead movement. Printers rely on major movement in two directions. The paper moves up and down (vertical movement) while the printhead moves left and right (lateral movement). Some heads rest at the left edge of the printing line, while others rest in the middle. Most heads print a line from left to right and then the next line from right to left. Printers that use this bidirectional printing can often figure out after printing a line whether it would be quicker to start the next line from the left or right edge (logic-seeking).

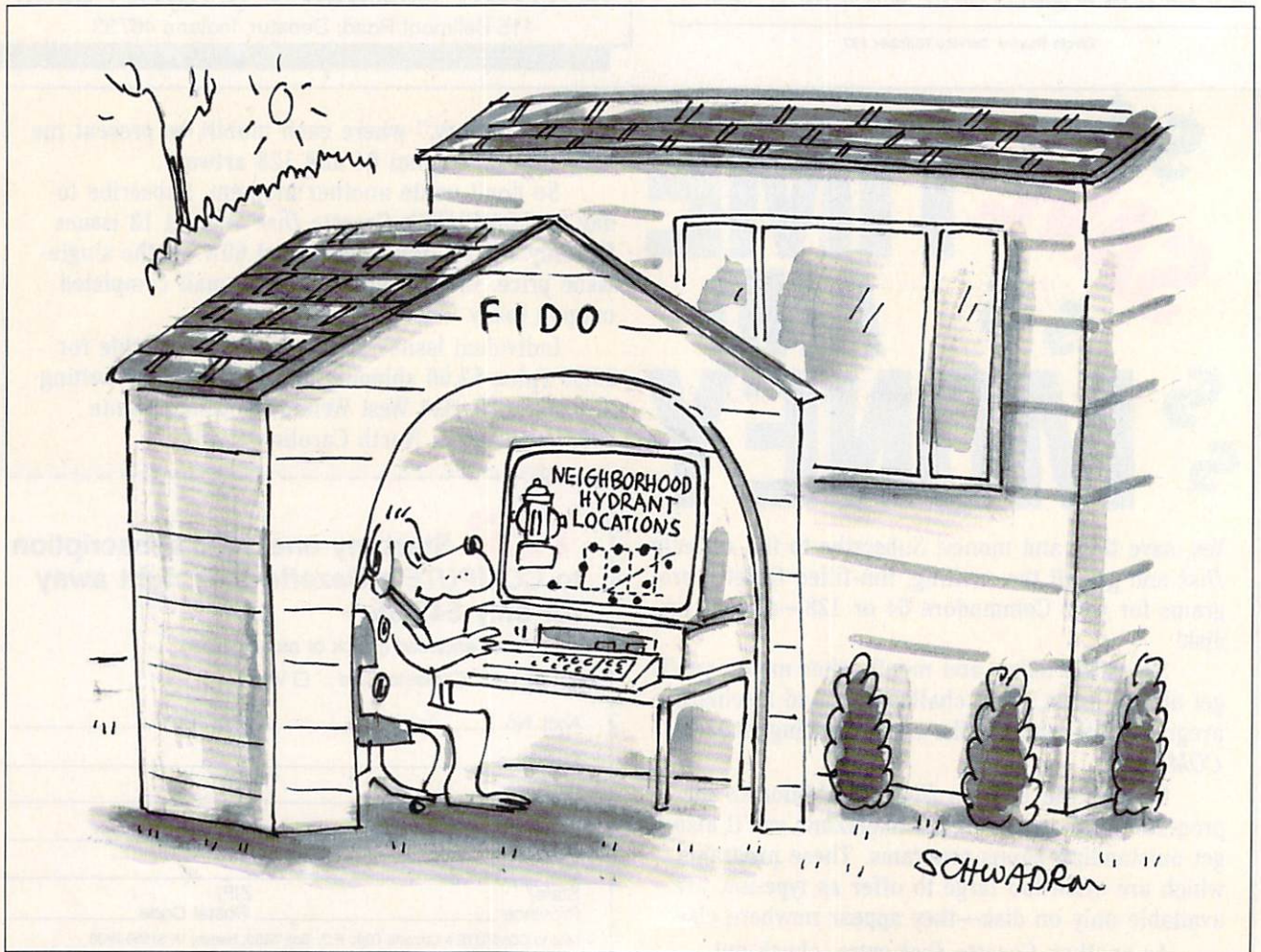
When printing graphics, you can either select bidirectional or unidirectional movement for improving vertical alignment, the lack of which shows up when printing a long vertical straight line. The faster a printer is, the more likely it is to print a vertical line

that appears to zigzag. Some printers compensate for this by allowing you to adjust the timing for the printhead to reach the starting point for each line (bidirectional timing adjustment).

As a printer grows old and the cog belts that move the head become loose, the misalignment becomes more noticeable. By adjusting the timing, you can get a few more miles out of it before you'll be forced to see a service technician.

Printheads must move parallel to the platen (paper) in order to make an even impression across the page. With age, this alignment could go out of whack, resulting in printouts with a darker left or right edge. A sawtooth test pattern that can be generated on some printers can readily reveal such a misalignment. The adjustment that corrects this problem shouldn't be attempted by an untrained person. This adjustment may also be required when replacing the printhead. (Such replacements aren't common unless you are heavily into printing bit-mapped images and large banners.)

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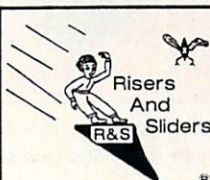
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BBU AND BBG

Experts said these products could never be made. It's a good thing Performance Peripherals didn't hear that, or it might not have created BBU and BBG. BBU is a battery backup cartridge for the 64 or 128 that provides permanent memory (nonvolatile) for Commodore RAM expansion units and geoRAM. BBG is a backup RAM disk for GEOS 2.0, GEOS 128, or Gateway (CMD's GEOS system). BBG is available in sizes ranging from 512K to 2MB.

BBU

One RAM cartridge technician told me that if a battery backup for an REU were developed, it would be the size of a car battery and wouldn't hold power for more than a few minutes. BBU uses an AC power supply backed up by four D batteries. While the power must be on for the cartridge contents to be accessible, I have left only the batteries connected for over a day without any loss of cartridge memory. With care, cartridge portability between computers should be possible as long as the batteries are connected.

BBU allows an REU to be used in its normal way. If you don't initialize the REU when you load the Commodore RAMDOS, whatever was previously stored in the REU will still be available. In my case, I've found programs that I'd copied between disks, Speed-Script, and images used by The Print Shop still in memory. Of course, if the program you use automatically initializes the REU, then its memory will be erased.

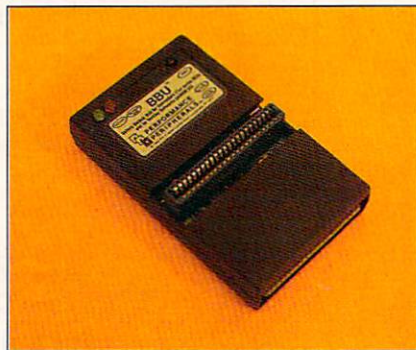
The Write Stuff word processor lets you use an REU to store its large dictionary and text files. I know an operator of a mail-order business who uses this word processor, and he would leave his 64 turned on from Monday to Friday, just to be sure he didn't lose anything. With BBU, the computer can be turned off without the fear of losing any files.

Many BBU users will place GEOS or Gateway in their cartridges. When Rboot is loaded from disk, GEOS and all required files are available in less than eight seconds. This technique makes GEOS a true operating system, since it no longer has to be loaded

from disk like a program.

BBG

BBG doesn't use an REU. It holds only GEOS 2.0 or Gateway. Loading BBG Rboot from a floppy disk provides equally fast access to the cartridge contents. This backup cartridge is available in sizes ranging from 512K to 2MB. If GEOS 2.0 is used with the provided



BBU is a battery backup interface module for 1700-series REUs and geoRAM 512.



BBG is a battery backup RAM disk for GEOS 2.0 and GEOS 128.

software, the cartridge configures itself in sections like the 1750-series RAM disk. On the 2MB model, this is like having five RAM disks. If Gateway is used, BBG is configured as one large RAM disk. With Gateway's Slider and Browse functions, this makes all files easily accessible.

The Aprospand board has four slots that allow up to four cartridges to be switched on or off with a 64 or 128. I have connected one of these boards to my cartridge port via a ribbon extender. This ribbon allows more economical use of table space. In the Aprospand slots I have connected a Quick

Brown Box (QBB) and BBU connected to a 1750 REU. A QBB-specific version of The Write Stuff word processor is in the QBB; the BBU-REU combination contains Gateway. With this setup, it's possible to stop writing in the middle of a text document, load geoTerm from the REU in eight seconds, and return to my word processor with no loss of text.

The Aprospand makes another interesting combination possible. I have used one board to access both BBU and BBG. I placed Gateway in both, and found that I could run GEOS from either with no interference from the other. This could increase your total available RAM for GEOS (separately accessible), or allow use of GEOS in one cartridge and Gateway in the other, since each system has different advantages. Employment of BBG and BBU together would require ordering BBG with the optional disable switch, so that it would not be available when BBU was being accessed. A reset switch is standard with BBU and available as an option with BBG.

None of my other cartridges works with either BBG or BBU. In order to use Gateway in my BBU-REU combination, I have sacrificed the ability to use the REU with other programs for fast disk and file copying.

Many Commodore users will choose to place BBG or BBU directly in their cartridge ports. This is how BBG and BBU were designed to be used. There should be no problems for any 64 or 128 with this configuration.

For very little money, REU owners can turn their 64s into permanent-memory machines with several thousand kilobytes of memory. GEOS users who don't own an REU should appreciate BBG especially for the large memory it offers. It's a tribute to Peter Fiset, the designer of both BBG and BBU, that a number of other combinations are possible with these devices.

Fiset is in a sense competing against himself, since he also developed the CMD RAMDrive, but RAMDrive is more expensive than these cartridges. BBU and BBG are for those of us who don't have a large budget, and who have more specific needs for our computers.

Although the experts said it couldn't

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The manual describes I Paint as producing hi-res interlaced color graphics for the 128D. I immediately found myself wondering what *interlaced* meant. I didn't have to look any further than the manual for an explanation.

Basically, a video image is made up of horizontal scan lines which are broken into two fields, one displaying even lines and the other odd lines. If an image is interlaced, the image of one field appears between the lines of the other field. This method doubles the number of lines holding information, which in turn doubles the vertical pixel resolution. I realize that this probably doesn't make much sense to a lot of computer users, but this is what gives you the greater resolution and all of the apparent colors. After all, interlaced graphics is what this program is about.

Getting started with the program posed a problem for me. I couldn't get it to load with my 1571 drive. The author provided me with a new program, but the same problem still plagued me. Finally, we hooked up a 1541 drive,

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REVIEWS

and the program loaded. The author took my disk and loaded it with his 1571 drive, so I'm inclined to think my drive was to blame.

To start, plug your mouse into port 1 and then boot the program. The first menu provides four options: Start, Setup, Install RAMDOS, or Exit. For the first time, choose Start. You can play around with the Setup process later. When you get around to setting up the program, one of the choices involves the mouse. It can be set up as either a left-handed or right-handed mouse. The setup configures the On button under your index finger and the Off button under your middle finger.

The next menu will be the main menu, which will present a selection of 14 options. These are Pen, Brush, Spray Can, Shapes, Fill, Palette, Magnify, Areas, Drawmode, Text, Files, Print, Options, and Clear. You'll notice that the Pen icon will be reversed. This indicates that the Pen mode is active. From this point on, the artist in you is given the freedom and power to create works from the most simple to the intricately involved.

I'm not an artist—computer or otherwise—but as I sat in front of the computer drawing cute little geometrical shapes and filling them in with different blocks of color, I felt rather creative and proud of what I could do with this program. Then I loaded some files of pictures the author had supplied. The impact of what could be done with this program was overwhelming. For the person who enjoys computer-aided drawing and creating personal designs, this is an ideal program.

You are provided with three modes of freehand drawing: Pen, Brush, and Spray Can. Each of these modes allows you to clip and paste and select colors while maintaining your choice of drawing mode. Each is represented by an icon on the main menu.

The Palette icon on the main menu calls up its own menu when clicked on. In the color mode, ink and paper colors are selected for both fields of the interlace screen. There are 16 colors from which to choose. By clicking on the palette on the submenu, you enter the Color Wash mode. Here, you are able to change colors without affecting the bitmap data. It is well worth the time to experiment with the effects that can be created using the various coloring combinations.

Paint includes all of the basic tools that can be found in most drawing programs. It gives you the ability to clip,

paste, reverse, flip, and create patterns. There's also a text mode that offers a choice of six fonts, a system font, and one loadable custom font. You can manipulate text as to its direction on the drawing and character size, and there are six other options for greater flexibility and creativity.

My only real complaint is that the program is slow to load and to print out my creations, but we can thank Commodore for that. Perhaps even that drawback has its advantage. I can start loading the program, go make my necessary cup of tea, and be back at the computer ready to work by the time that the program has loaded.

I Paint is a powerful graphics program. It's loaded with features that time and space don't allow me to go into, so I can't give them their proper due. If you're the type of person who enjoys drawing at the computer and creating graphic designs, then this program is well worth your time and financial investment.

CHERYL SCHUH

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Questions
and answers about
switching out
ROM to get more
RAM, printers,
interfaces, and more

More RAM

I know the 64 has 8K of RAM under BASIC ROM at 40960-49151 and that it can be used as long as BASIC isn't being used. Which machine language LDA and STA do I need to use to switch between ROM and RAM?

NICOLE BLAKE
NEW YORK, NY

I'd like to write a program entirely in ML, but I need about 50K of free RAM. My machine language book says I can free a memory block from \$0801 to \$CFFF with LDA #\$36: STA \$01. But when I do this, the computer crashes. Either something's wrong with my computer or I can't use this free RAM in direct mode. Can you tell me how can I program this memory?

JASPER HOUK
QUINBY CUL, VA

Bit 0 of location 1 determines whether the computer sees memory at \$A000-\$BFFF as BASIC ROM or as the RAM underneath. Bit 1, likewise, sees memory at \$E000-\$FFFF as Kernal ROM or as the RAM underneath. If either bit is on, ROM is enabled. If both are off, the memory is available. On the 64, to turn off the BASIC ROM, store a \$06 into location \$01. To turn off both BASIC and Kernal ROM, store a \$04 in location \$01. To recover both, store a \$07 in the same location. You mustn't turn off the Kernal ROM with BASIC ROM still engaged because BASIC relies upon the Kernal.

If you make this memory available without copying ROM to the RAM underneath, you pay a price—you lose BASIC ROM and/or Kernal ROM. BASIC is gone, which is fine if you're writing a program entirely in ML and if the program doesn't call any built-in ROM routines from that area. But

you must store a \$07 to location \$01 before you end the ML program and return to direct mode. BASIC is in charge of monitoring your keypresses, printing them to the screen, and interpreting commands (such as RUN or SYS) that you might type. If you've switched out BASIC, direct mode will seem to be locked up.

What about the case where you've copied the ROM routines to the RAM underneath? Well, as long as the process was done correctly and that RAM wasn't overwritten later, switching out ROM should be no problem. The correct way of writing BASIC ROM to RAM is as simple as the following.

FOR X=40960 TO 49151: POKE X, PEEK(X): NEXT

Just modify the range to cover the addresses from 57344 to 65535 if you want the Kernal ROM copied also. Whatever you do, don't disable BASIC until after this routine has run, because it uses BASIC to work!

Software or Interface?

I have a 64, a 1541 disk drive, an Epson RX-80 printer, and a Turboprint/GT interface. I wrote a multipage report in Homeword with top, bottom, and side borders defined according to the word processor's instructions. When the report was printed, the first page was OK, but each succeeding page went beyond the bottom border and crossed over the page serrations.

When I initially set up the printer and interface, I set the DIP switches by the instructions. I did find that I had to set one on the printer to off to prevent double-spacing because the computer controls the linefeed. The test pro-

gram built into the printer worked perfectly across multipage prints, recognizing the end of the page and going to the next page.

Am I the one at fault? Or is the problem with the software or the interface?

SCARLET LYNCH
WAYCROSS, GA

There are a couple of solutions to your problem. But first here's an explanation which applies to printers and interfaces in general.

When the printer finishes printing a line, two things need to happen: The print-head should move to the beginning of the line, and the paper should advance one line. Traditionally, a carriage return (CR) only moves the print-head to the beginning of the line it's on. It can thus be used to print a line and go back to the beginning to underline or overstrike various characters that are already printed. A separate linefeed (LF) character causes the paper to move up a line. The ASCII codes for CR and LF are CHR\$(13) and CHR\$(10), respectively.

Commodore printers and screens use only a CR at the end of a line. In this case, CHR\$(13) means move to the beginning of a line and move to the next line. It also means you need to add a linefeed when you print something to the printer.

The printer, the interface, and the computer are all programmable. There are a variety of ASCII codes you can use to send commands to each of them. In addition, printers and interfaces generally have rows of DIP switches you can set to create various effects.

All three devices—the computer, the interface, and the printer—are capable of adding the linefeed. The question

is, who's in charge? If no device adds a CHR\$(10), everything will print on the same line. On the other hand, you could have a program that sends a 13 plus a 10. The interface sees the 13 and adds another CHR\$(10), and the printer says to itself, "Aha, a 13 just arrived. I'd better add a linefeed." In this case, you'd have triple spacing.

It doesn't really matter which device adds the linefeed, as long as one (and only one) does so.

The same idea applies to skipping over the perforation at the end of the page. You've indicated that the printer is set to skip over the perforation. The printer keeps a tally of how many lines have been printed so far. When the page is nearly full, it skips ahead a few lines to start a new page.

The problem is that your word processing program is doing the same thing. When it approaches the bottom of a page, it sends some blank lines. In the meantime, the printer has also decided to move to the next page and, when it gets there, starts printing the blank lines the computer has sent.

You'll have to decide who's in charge of skipping over the perforation between pages. If it's the printer, then set the word processing program to have no margin at the top or bottom. If the word processor controls the margins, then you'll have to turn off the automatic paging feature of the printer.

Empty Arrays

I'm writing a program on my 128 using 80 columns, and I'm having a problem handling arrays. If no data is entered in an array, the data doesn't stay where I put it. The first time through the program, everything is where it

should be. On each subsequent reading of the sequential file, data shifts to the left to fill any empty arrays.

ALVIN DWINDLE
MCLEAN, VA

When you create an array using DIM, numeric arrays are initialized to 0s, and string arrays are initialized to null strings. A null string contains no characters; it's a string full of nothing. If you open a sequential file and write a null string to it, you're writing nothing at all to the file. A PRINT# statement generally adds a carriage return—CHR\$(13)—after each string or number, so if you examine the contents of the file, you'll see a CHR\$(13) only. We experimented a bit with sequential files and discovered that INPUT# doesn't like null strings. For example, if you PRINT# "ABC" followed by a null string and then "DEF" and read through the characters (with GET#), you'll see 65, 66, 67, 13, 13, 68, 69, 70, 13—three ASCII characters for ABC, a 13, nothing for the null string, another 13, then three ASCII characters for DEF, followed by another 13 (carriage return).

If you INPUT# from the file, you'll receive an ABC and a DEF, but no null string. This is true in both 64 and 128 modes.

A couple of solutions are available. The first is to avoid writing a null string if you're going to use INPUT# to read the file. Instead, send some character to indicate a null entry. INPUT and INPUT# ignore leading spaces, so don't send a space. You should be able to use any other character—including a shifted space, CHR\$(160). The second is to avoid using INPUT#. If you use GET# to retrieve one character at a time, you can concatenate the string un-

til it encounters a CHR\$(13).

Graphics Mode

While trying to write a simulation program for the Commodore 128, I can't get variables to print in the graphics mode. Here is part of my program.

```
10 GRAPHIC 1,1
15 H=180
20 CHAR 1,5,5,"HEADING:"
   ;H
```

The variable in line 20 doesn't print out. What's wrong?

STEVE PETTIGREW
COLTON, CA

BASIC 7.0's CHAR statement won't print the value of a numeric variable; it will display only strings (or the contents of string variables). Fortunately, BASIC provides a simple way to generate a string containing the digits of a numeric variable—the STR\$ function. For example, A\$=STR\$(123) produces the same result as A\$="123", and STR\$(H) will produce the string equivalent of the value of the numeric variable H. There's just one other consideration: Unlike PRINT, CHAR will display only a single string, so you can't use print separators like the semicolon you have in line 20 above. Instead, you must use the + operator to concatenate (join) any substrings into a single string. Here's a workable version of line 20 for your program fragment:

```
20 CHAR 1,5,5,"HEADING:"
   +STR$(H)
```

Do you have a question or comment? Have you discovered something that could help other Commodore users? Write to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

Working with
arrays and printing
variables in
graphics mode on
the 128

PD PICKS

Steve Vander Ark

1581 UTILITIES

For the past two issues I've been rummaging around in QuantumLink's more exciting (sillier?) corners, pulling out some dynamite games—the kind of games that'll keep you glued to your monitor for hours. Hey, I happen to like games! So, sue me!

But enough games! How about something for you 1581 users? This month I figured I'd dish up something a little different: utilities—some really excellent, head-banging utilities. A contradiction of terms, you say? Not on your life. Utilities have their own kind of cool, especially the ones I've scrounged up for you. The point is, when you need utilities, these will do the job with that little extra oompf that almost makes the work fun.

If you're humming "Spoonful of Sugar" now and shaking your head, just hang on. You need to format a disk and rearrange a directory now and then, same as anyone else. Unless you get a thrill out of memorizing BASIC's gobbledygook commands, you'll be glad to have these utilities around. Trust me!

1581 Disk Utilities

By Joe Gilberto

Q-Link filename: 1581 UT-128R1.5, uploaded by DrJoe. This program requires a 128 with a 1581 or other drive and an 80-column monitor.

It's hard to find a good disk utility on Q-Link by simply browsing the libraries. Every one of the myriad files in that area has the name Disk Utility, which tells you nothing. That's why I'm all for gutsy names, the kind that get your attention. Fortunately, Q-Link users often leave comments on files after they've downloaded them and taken them for a spin. I started perusing the comments and quickly nar-

rowed the utilities down to just a few that really have some substance.

This nifty program was the winner, hands down. I do wish it had a snazzier name, something macho like Disk Commander or clever like Disk-Functional or even just plain weird like Diskom-BooBaLate. A good name would make you want to try this puppy out. But it's a utility, so it's got a boring name.

You won't have to look deeper than a sprite or two to notice this program's elegant touches. It uses windows to set up the 80-column screen in two sections, one for the menu of options and the other for displaying disk directories. It does this with all the sleekness of a Jaguar parked in front of the opera. It flips you back and forth between menus just as smoothly, always taking you where you want to go in the program with quiet ease. Unobtrusive prompts remind you to turn up your monitor's sound so you'll get the full effect of the SID chip's contribution.

I don't know why, but the 80-column screen always seems to have its own special elegance, a kind of ambience of efficiency with a touch of a smile. If you don't have a clue as to what I'm talking about, check out this program for a good example.

Its list of options includes all the usual disk and file functions: copying, renaming, deleting, and so on. The 1581 drive in particular is supported with numerous features designed for that device only. The program works with CMD's RAM devices, but not between their partitions. If you do heavy-duty work on those devices, you're better off with CMD's own utility disks.

And last but not least, get a load of that error sound! There's no way I can de-

scribe it to you, but it's almost worth getting this program just to hear it!

1581 Directory Assistant

By Captain Morgan

Q-Link filename: 1581DIR/CAPCODE, uploaded by Dakkri. This program works with a 1581 and a 64 or 128.

I have been running myself ragged trying to find a 64 disk utility program with as much pizzazz as the 128's 1581 Disk Utilities. This one, 1581 Directory Assistant, is similar, with a slick opening graphics screen and interface. In addition to the usual formatting and file handling, it features an option to add a dashed line in the directory listing to separate group files.

There are a few drawbacks to this program. For one thing, it didn't seem to want to recognize my CMD FD-4000 disk drive as a 1581, even though I had a 1581-format disk in the drive. That surprised me, since the FD has always doubled as a 1581 without the slightest hitch. Second—and this will affect more of you—this program is for the 1581 drive only; it includes no commands for the 1541, 1571, or any RAM device. I know that quite a few of you use one of those other types of drives at least as much as you do a 1581, so this utility must be only one of several you'll need to get your work done.

But don't get me wrong; this program is a very nice piece of work. It does what it's supposed to and even manages to do it with a little flair. The author has tried to include every type of 1581 option he could imagine.

So if you have a 1581, you'll want to check out these two programs. Look for them on a BBS near you, on QuantumLink, or on this month's Gazette Disk. □

Here are a couple of excellent, head-banging utilities that'll make managing a 1581 drive almost fun.

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MACHINE LANGUAGE

Jim Butterfield

BOOT BASICS

There are several ways to choose a location for a machine language program. One good method is to stick it onto the end of a BASIC program. That way, BASIC and ML will load together. A method that I often use in this column is to poke the program into a chosen part of memory.

When a machine language program is located away from its BASIC driver, it's often necessary for the BASIC and ML programs to be loaded in separate actions. To spare the user from the need to type a complex loading sequence, programmers use boot programs.

A boot program may load many items into various parts of memory. For example, you could have it load a video screen, a machine language program, and a music player.

We'll look at a simple boot program that loads a machine language program from disk and then proceeds to call it as needed. First, let's create a very simple ML program that prints the message *HELLO*.

```
2000 LDX #000
2002 LDA $200E,X
      JSR $FFD2
      INX
      CPX #007
      BNE $2002
      RTS
0200E 48 45 4C 4C 4F 21 0D
```

Using a machine language monitor program, you could enter the code almost exactly as shown above and then save it to disk with a command such as: S "HI.ML",08,2000,2015. You could also create the program using the following BASIC program.

```
100 REM HELLO ML MAKER
110 DATA 0,32
120 DATA 162,0,189,14,32,32,
    210,255
130 DATA 232,224,7,208,245,96
```

```
140 DATA 72,69,76,76,79,33,13
200 OPEN 1,8,2,"0:HI.ML,P,W"
210 READ A:T=A
220 PRINT#1,CHR$(A);
230 N=N+1
240 IF N<23 GOTO 210
250 CLOSE 1
260 PRINT "FILE WRITTEN!"
270 IF T<>2356 THEN PRINT
    "... WRONG!"
```

Do not overlook the semicolon at the end of line 220. Run the program, and it will generate file HI.ML. Later, if you enter *LOAD "HI.ML",8,1* followed by *SYS 8192*, the program prints *HELLO!* The extra ,1 at the end of the *LOAD* command forces the program to be loaded without relocation at address hex 2000 (decimal 8192).

Now, we'll ask a BASIC program to act as a boot, bringing in our HI.ML program and then calling upon it to perform the greeting. Before we do, however, we must go to "boot camp" and learn some new rules.

On the Commodore 128, command *BLOAD "HI.ML"* would do everything we needed: It would bring in the program and allow us to continue with more code. On other machines, we must deal with the chain effect.

When a program brings something into memory using *LOAD*, a curious thing happens. The program returns to its first statement because the computer anticipates a chain, a program destroying itself by loading in a fresh program over its own memory space.

It's fun to work with BASIC chaining, getting one program to do some work, then calling in another program to continue the job. That's not our task here. But before we pick up our HI.ML job, here's a tip for those who would like to play with BASIC chaining: Programs loaded by chaining

must be no bigger than the first program of the chain.

Back to our task. We wish to load the machine language program into memory, but this loading action will cause our program to go back to its first statement. That's almost the same as the program starting over, except that now the program's variables could contain values. You might think that the program must end up caught in a loop. First, it will load, then it will go back and load, and so on. But there's a way around this problem.

When a program goes back to its first statement after performing *LOAD*, it doesn't lose its variable values. Suppose the first program statement is *IF X=1 GOTO*. When the program starts, all variables, X included, are 0. So we won't take the *GOTO* branch. As our program continues, we may now set *X=1* and then *LOAD*. The program will return to its first statement, but this time it will take the *GOTO* and then proceed.

The following code uses *ON X* instead of *if X=1*, but the principle is the same. When we start, the program proceeds to lines 110 and 120 and executes the *LOAD* command. The program never reaches line 130; instead, it returns to its first statement. This time, X has a value of 1, so the program immediately leaps to line 200.

Here's the tiny program. Don't forget to use the command *NEW* before entering it.

```
100 ON X GOTO 200
110 X=1
120 LOAD "HI.ML",8,1
130 STOP
200 PRINT "ML NOW
    LOADED"
210 SYS 8192
220 END
```

Can you see why the program never reaches line 130? □

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a machine language
program from
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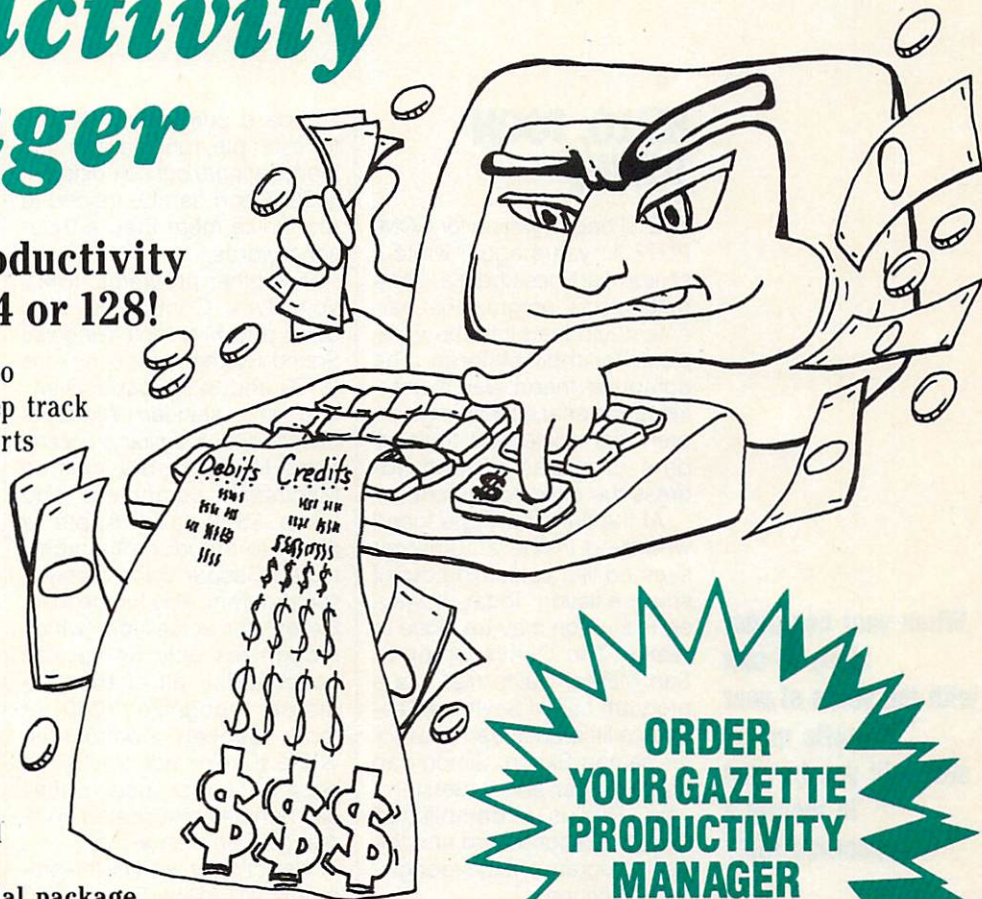
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D'IVERSIONS

Fred D'Ignazio

HELLO, TOON TOWN!

When I began writing for COMPUTE 11 years ago, I wrote a series of articles about a "computer friend" program that parents could load into the computer for their children. The computer friend was a user-friendly interface for young children that would take their orders, play games, and address the children by name.

At the time, having a friend who lived inside a computer seemed like something out of science fiction. Today, however, this vision may be close to reality. The Qualix Group in San Mateo, California, has a program called SayIt that features a little onscreen character named Simon. Simon can actually hear and understand you. This is accomplished through a sound card and the SayIt program's voice-recognition functions.

When the program is first loaded into the computer, Simon pops onto the screen in ready mode. Once you attach a microphone and activate him, he puts his hand to his ear and announces that he's listening for your first voice command. If he understands your command, he gives you the thumbs-up sign. If he can't understand your command, he scratches his head to show you that he's confused. If you don't want him eavesdropping on your regular conversations, you issue the voice command, "Cover your ears!" and he puts his fingers in his ears to show you that he's not listening.

Voice-recognition programs aren't new. What is new is personalizing the program with a computer friend like Simon. Even more important, the newest programs have far greater power than their older counterparts, and they run on

standard computers. Simon, for example, runs only on Sun Workstations, but he costs only \$295 and can be trained to recognize more than a thousand words.

Two other programs, IBM's VoiceType Control for Windows and Microsoft Windows Sound System cost even less (\$129 and \$289 respectively) and run on standard Windows-based PCs. A similar program, Voice Navigator SW, runs on Macintosh computers and costs \$399, and Apple is about to introduce its highly touted Caspar voice-recognition program, also for the Mac. Except for VoiceType (which recognizes only 64 spoken commands), all of the programs recognize 1000 or more spoken commands. While they're not up to the pace of normal speech, they can handle complicated commands if spoken slowly.

It's not clear yet if all the programs will follow SayIt's lead with a cute, friendly character like Simon, but it is clear that these programs will revolutionize the way we use computers. And the newer speech-recognition programs are coupled with high-fidelity speech synthesis programs that let the computer talk back.

One immediate application of the new speech technology that is already available to all of us (even those of us without PCs) is AT & T's new talking telephone that was introduced nationwide last summer. When you dial 0 in many parts of the country, you no longer get a human operator. Instead, you get a computer equipped with speech recognition and speech synthesis. The computer prompts you to place your collect, person-to-person, or credit-card call. If it can't understand you, however, it's supposed to ask a human operator to step in.

Theoretically, this is great,

but sometimes things don't work as we would like. For example, last week my 14-year-old son Eric was downtown, and he needed his mother to pick him up in the car when it started to rain. He had no money, so he dialed 0 to place a collect call to our home. When my wife answered the phone, she heard Eric identifying himself to the computer operator. "Eric D'Ignazio," he said.

"I don't understand you," said the computerized voice. "Please repeat."

"E-ric D'Ig-nay-zee-oh," Eric repeated, enunciating slowly and clearly.

"I don't understand you," the computer said. And it hung up!

Eric has spent 14 years in the company of a mad hacker father, so he's learned to be tolerant of computers. He promptly redialed and tried his luck again. Still no luck. He tried again. No luck. Finally, Eric gave up and walked home in the cold, pouring rain.

When he arrived home, dripping wet and sneezing, he and his mother vowed that the next time this happened, they would rip the offending pay phone from the wall and deliver it personally to the local telephone company executives who have replaced human operators with brain-damaged computers who can't understand English!

Unfortunately, even the phone company's advanced voice-recognition systems are far from perfect. If you have a stuffy nose or a frog in your throat, it's less likely that the computer will understand your spoken commands. Also, background noise can mix with your voice and confuse the computer. So it seems that even though we are stuck with computer operators, it may still be some time before they can even remotely be classified as computer friends.

When your computer starts to talk with the voice of your favorite movie star, will you be cast in merely a supporting role?

But the real frontiers in human-computer relations still lie ahead. Imagine a whole office full of talking, listening computers. If the experts are right and the keyboard really is a dinosaur, then in the future we'll all be communicating with our computers via voice. We'll give a verbal order to our computers, and they will respond with a verbal reply. If only one or two workers in the office are carrying on conversations with their computers, then it's little more than a nuisance or curiosity to the other workers. But can you imagine five, ten, or twenty people firing off voice commands to their computers and their computers answering back? Remember, too, that most people tend to talk to a computer in a loud voice in order to make sure that the computer understands. They also speak to the computer slowly and clearly as if the computer were a not-so-bright servant or pet.

The result is obvious: computer cacophony. But that's not the worst of it. With voice-sensitive computers sitting on everyone's desktop, it's likely that a command intended for one computer will mistakenly be obeyed by another computer. Having an office full of eavesdropping computers could lead to catastrophe if someone orders one computer to delete a file or format a disk. It could also lead to office-wide insanity if a number of commands are picked up by other people's computers and they start dialing telephones, changing thermostats, turning off lights, printing documents, and playing music files and voice mail.

We may have to adopt radical methods to curb this computer eavesdropping and cacophony. One solution is to make computer microphones highly directional and ultrasensitive. This would permit us to become highly intimate with our computers. We could lean over them confidentially and whisper sweet commands into their tiny little ears. Another solution would be for us to stagger our working hours so that we could come into the office late at odd hours to have our serious human-to-computer conversations.

This is only the tip of the iceberg. When talking and listening computers really invade our offices, we'll generate enough materials to keep psychologists, sociologists, and comedians hap-

py for years. Since most computers are going portable, this new human-machine relationship will not be confined to the office.

Our little chatty computers will soon go under our arms to libraries, onto airplanes, and into classrooms and auditoriums. And judging from the new generation of talking screen savers and software that licenses the voices of famous celebrities and personalities, we'll soon be inundated with a symphony of little voices that sound like Ronald Reagan, Clint Eastwood, Scotty on the Starship *Enterprise*, and Rod Serling on "The Twilight Zone."

We'll want to personalize our computers and turn them into cute little pets. We'll want our computers to speak to us in the voice of our favorite rock musician, politician, or soap opera star. The cumulative effect will be an intense feeling of vertigo, as if we had fallen into a Roger Rabbit cartoon and were surrounded by animated characters and disembodied voices. The result will be that the real world, already disorienting and absurd, may soon come to resemble a kind of cybernetic Toon Town. And we'll be wondering if we're just one of the players. □

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BEGINNER BASIC

Larry Cotton

READING DATA

Data is one of the more common words in computer lingo, ranking right up there with the words *bytes* and *RAM*. Data is what the computer uses to solve problems, create images, make music, or write letters. Data consists of words that are processed, numbers that are crunched, and points to which lines are connected.

Data can be processed once it's in the computer, but how does it get there? The answer to that question depends on the programmer and on how the program is constructed. Data is often written into the program itself, in which case the BASIC keywords *READ* and *DATA* are necessary to process it. Here's a simple example.

```
10 READ A,B
20 PRINT A+B
30 DATA 4,5
```

This program reads two pieces of data in line 30 which the programmer has included as part of the program. It then adds the two data items and prints the sum. The syntax of *READ* and *DATA* statements is very important. Make sure that the variable names (such as *A* and *B*) and the data itself are separated by commas, not periods or spaces.

When the computer encounters the command *READ*, it immediately looks for variable values to read. In this case, since *A* and *B* are numeric variables (as opposed to variables which represent words), the computer looks for two numbers to read in a *DATA* line. If more than two numbers are in the *DATA* line, the above program will read only the first two. If the *DATA* line contains less than two numbers, the program will stop with an *OUT-OF-DATA* error message.

To get the computer to handle words (known as literal or string data), we have to make a few changes.

```
10 READ A$,B$
20 PRINT A$+" "+B$
30 DATA BILL,CLINTON
```

The dollar sign denotes a string variable. *A\$* (pronounced *A* string) and *B\$* are treated literally. So, if the data were numbers, as string variables, *A\$* and *B\$* can't be mathematically manipulated (such as added or divided.)

Of course, you can do many other things with data. Here's an example using mixed data types.

```
10 READ A$,B$,A,B
20 PRINT A$+" IS" A "AND " B$
   " IS " B
30 DATA BONNIE,CLYDE,40,42
```

The variables and the data must have matching formats and be in the proper order. While a string variable can read a number, a numeric variable can't read a string.

Arrays—the pigeonholes I mentioned last month—can be filled with data as follows.

```
10 FOR T=1 TO 8
20 READ A(T)
30 PRINT A(T)
40 NEXT
50 DATA 11,6,4,12,30,5,214,67
```

This example uses a *FOR-NEXT* loop to fill an array with data, a very useful technique for manipulating lots of information. *A(1)* will become 11, *A(2)* will become 6, and so on. Can you begin to see the implications for using arrays to store data?

Incidentally, if your array has more than ten entries, you must add a *DIM* statement at the beginning of the program. This statement sets aside space within the computer's memory to store the data.

```
10 DIM N$(15)
20 FOR J=1 TO 15
30 READ N$(J)
40 NEXT
50 DATA TOM,DICK,HARRY,
   JANE,SUE,BRENDA,SUZANNE,
   JIM,MARTIN,LOUISE,TERRY
60 DATA MADONNA,FLOPSY,
   MOPSY,COTTONTAIL
```

Again, make sure that the number of *DATA* items matches the size of your array. In this example, we've only filled the array; we haven't done anything with it. *N\$(3)* will be *HARRY*, *N\$(12)* will be *MADONNA*, and so on.

What you do with data is up to you. You can print it, write a story with it, multiply it, draw with it, list it, catalog it, and so on. But what if your data is changeable?

Suppose a class never has the same 15 students in it? You need to get information from the person who's using the program with the ubiquitous *INPUT* statement. We've reviewed *INPUT* recently, so I won't dwell on it now. Here's a simple example.

```
5 PRINT "[CLR][DOWN]PRESS
   RETURN AFTER EACH ENTRY."
10 PRINT:INPUT "HOW MANY
   CLASS MEMBERS";M
20 J=1:DIM N$(M):PRINT
30 INPUT "CLASS MEMBER
   NAME";CMS
40 N$(J)=CMS
50 IF J=M THEN 80
60 IF CMS=" " THEN 80
70 J=J+1:PRINT:GOTO 30
80 PRINT CHR$(147)
90 PRINT:PRINT "THE CLASS
   MEMBERS ARE":PRINT
100 FOR T=1 TO J:PRINT
   N$(T):NEXT
```

INPUT waits patiently until the person at the keyboard types something and presses the Return key. The data is stored in the *N\$(M)* array.

Next month, we'll look at ways to save your precious data for future use! □

As the raw material that a computer processes, data can be either part of the program or entered by the user.

Steve Vander Ark

BEEP! BEEP!

There's been a lot of noise coming from the IBM crowd lately. Most of it has to do with that GEOS clone that they call Windows. The latest pastime for Windows aficionados is to load sound bites that are then keyed to various system events.

Whenever you click on a button, Windows cranks out that digitized bit of sound that you've selected. For example, you might have the Roadrunner cartoon character utter his famous "Beep! Beep!" every time you close a window. These sound files are a lot of fun, and there are scads of them to be found on various bulletin boards and on commercial services such as GENie and CompuServe.

Of course, the 64 was doing sound long before these IBM wonders were even born—and doing it better than anyone. Back when the IBM could barely beep, the 64 was gracing its games with three-voice sound produced by that amazing bit of electronics, the SID chip. With a few PEEKs and POKEs, any BASIC programmer could create sound and music.

It wasn't long before programs like Music Construction Set put the ability to create music within anyone's reach. When the 128 came along, its enhanced BASIC commands made programming simple. Six voices and stereo capabilities became possible when the SID Symphony cartridge (available now from Creative Micro Designs) added an extra SID chip to the Commodore system.

I realize that there's a difference between Commodore's multivoice music and Windows' digitized sounds, but the 64 is capable of playing digitized sounds, too. Its only limitation is memory, since digit-

ized sound eats kilobytes about as fast as my daughter gobbles potato chips.

The premier program for importing and playing digitized sound files is DigiPlayer by Mark Dickenson. It's available on QuantumLink as shareware. (To help you download it more easily, its filename is DIGIPLAYER31.SDA, and it was uploaded by Mark AD I.)

OK, what's all this have to do with GEOS? There are a couple of programs on Q-Link that will let you import sound files converted with DigiPlayer into a format that GEOS can use. Since DigiPlayer files use the file extension RAW, I'll call them RAW files. One GEOS program which actually plays them is an auto-exec file called AUTORAW. (Filename: AUTORAW, uploaded by WillJ14.) Auto-exec files run automatically when you boot your system.

Let me give you an example of how you can put this technique to use. In the GEOS message area on Q-Link, several users report that they use geoRAW to signal when their system has finished booting. Many people use auto-exec files such as QwikStash to load a RAM device automatically during the boot process. This is convenient, but time consuming. So, rather than just sitting and staring at the screen, let digitized sounds or voice clips inform you when everything is loaded. One popular sound file to use for this is the voice of the HAL 9000 computer from *2001: A Space Odyssey*. When you hear HAL's voice, you know that your system is up and waiting for you.

You can also use a program called Raw (Q-Link filename: RAW V1.1, uploaded by Denton2) to play all of your RAW files sequentially. Unfortunately, this utility was uploaded in an unfinished form. It

plays the sound files all right, but it includes no slick interface screens, no file selector box to pick a file to play, and not even a real icon, but at least it gives us digitized sound.

Digitized sound is great, but let's not forget all those wonderful music files out there. These files, usually referred to as SID files, often carry the file extension MUS. Some files even include words and artwork. Stereo SID files which utilize the extra SID chip are also plentiful.

You can play all those wonderful three-voice SIDs using geoSIDPlayer. This neat utility lets you choose SID music files from a standard file selector dialog box. It then plays a file for you while a little guy on the screen taps his foot and grins. GeoSIDPlayer is available in the Q-Link GEOS libraries. Its filename is GEO-SIDPLAYER, and it was uploaded by RogerLU. Unfortunately, there is no stereo player for GEOS, but since most GEOS users have their cartridge port already filled with a RAM device of some kind, they wouldn't have room for a music cartridge anyway.

All these programs work fine, but I would love to see some more work done with sound programs for GEOS. I'd like to see the digitized sound player cleaned up and given a proper interface. I'd like a SID player for GEOS that displays the words if a WRD file is included. And that's not all. Someone on Q-Link a few weeks ago was talking about programming a SID player that would play in the background so you could listen to your favorite tunes while you're pounding the keys in geoWrite or mouse-hopping in geoPublish. Now that sounds like a dream GEOS program to me. I think I'd call it geoJukebox. □

You know GEOS is geared toward graphics, but have you heard about its outstanding audio capabilities?

PROGRAMMER'S PAGE

Randy Thompson

VECTORS, BOUNCERS, AND BASIC SAVERS

We have some more great tips from readers this month, so let's get to them.

Vector Addition

This program performs vector addition on two vectors and gives the resultant vector's magnitude and angle. The magnitudes and angles (between 0 and 360 degrees) of the vectors to be added are all that you enter. This can be a useful little program for physics students.

NILES NOONAN
TINLEY PARK, IL

```
XD 100 REM VECTOR FINDER
PJ 105 DIM M(3),A(3):QS="Y"
JM 110 X=0:Y=0
AC 120 DEF FN R(X)=(INT(X*1000
+.5))/1000
KQ 130 FOR I=1 TO 2
QA 140 PRINT
AA 150 PRINT "MAGNITUDE OF VEC
TOR";I;
MJ 160 INPUT M(I)
DQ 170 PRINT "ANGLE OF VECTOR"
;I;
SF 180 INPUT A(I)
BH 190 A(I)=A(I)*PI/180
GK 200 Y=M(I)*SIN(A(I))+Y
MF 210 X=M(I)*COS(A(I))+X
QD 220 NEXT I
XR 230 M(3)=FN R(SQR(X*X+Y*Y))
DP 240 A(3)=FN R(ATN(Y/X))*18
0/1
EA 250 IF X<0 THEN A(3)=A(3)+1
80
DA 260 IF A(3)<0 THEN A(3)=A(3
)+360
PC 270 IF M(3)=0 THEN A(3)=0
HK 280 PRINT
AK 290 PRINT "MAGNITUDE OF RES
ULTANT VECTOR ="M(3)
SK 300 PRINT "ANGLE OF RESULTA
NT VECTOR ="A(3)
GM 310 PRINT
AA 320 PRINT "FIGURE ANOTHER";
BC 330 INPUT QS
HM 340 IF QS="Y" THEN 110
```

Screen Bouncer

Using a technique known as flexible line distance, the following program smoothly "bounces" the 64's screen down and up. Be sure to remove all cartridges from your computer before you run the program. After you load and run the program, type SYS 49152 to set your screen in motion. Press Run/Stop-Re-

store to return your computer to a more stable state.

```
SE 5 D=90
KC 10 READ A:IFA=-1THEN40
PK 20 IFA>256THEN50
CF 30 B=B+A:POKE49152+C,A:C=C+
1:GOTO10
MA 40 PRINT "ALL DONE! {RVS}SY
S 49152{OFF} TO INSTALL.
":POKE16383,170:END
RP 50 D=D+10:IFB=ATHENB=0:GOTO
10
JD 60 PRINT"{CLR}YOU TYPED LIN
E"D"IN WRONG. RECHECK AN
D{RVS}RUN{OFF} AGAIN!"
CK 70 PRINT "{2 DOWN}LIST"D"
{3 UP}":POKE631,13:POKE
{SPACE}198,1
AF 100 DATA 169,147,32,210,255
,120,162,1,142,26,208,2
02,142,32,208,2056
KG 110 DATA 169,49,141,18,208,
169,127,141,13,220,169,
27,141,17,208,169,1986
SK 120 DATA 42,162,192,141,20,
3,142,21,3,88,96,238,25
,208,238,112,192,1923
XK 130 DATA 173,112,192,16,11,
41,127,141,111,192,169,
128,56,237,111,192,170,
2179
XE 140 DATA 208,2,162,1,172,18
,208,152,56,233,2,41,7,
9,16,141,17,1445
HC 150 DATA 208,204,18,208,240
,251,208,202,208,236,17
3,18,208,208,251,169,27
,3029
AJ 160 DATA 141,17,208,173,13,
220,76,49,234,0,0,0,1,1
132,-1
```

The secret to smoothly moving the 64's screen down and up is simple yet ingenious. This program installs a vertical-blank interrupt that temporarily keeps the computer's VIC chip (the chip responsible for the 64's video display) so busy that it won't have time to send any video information to your monitor. The longer the program occupies the VIC chip's time, the longer the screen's video output is delayed, and the lower the screen's graphics appear on your television or monitor. To get rid of the streaks the program leaves in the empty areas at the top of the screen, type POKE 16838,0 while the program is running.

BOB BRODERICK
SAN RAMON, CA

Easy Program Protection

If you want to read-protect your BASIC programs (make them unloadable by BASIC),

Richard Reano of San Diego, California, has two suggestions: Save your programs as sequential files, or, better yet, save them as user files.

When using the SAVE command, add a comma and the letter S after the filename to save a program as a sequential file, or add a comma and the letter U to save it as a user file.

SAVE "filename,S",8

SAVE "filename,U",8

Now, when you list the disk directory, you'll find that your PRG file has become a SEQ orUSR file. And if you try to load the file, BASIC responds with a FILE TYPE MISMATCH error message.

Actually, there is a way to load these modified files, but you have to know the secret. To load one of these files, use the same ,S or ,U you used when you saved the program. For example, to load a BASIC program saved with SAVE "filename,S",8, use LOAD "filename,S",8.

Taking It With You

Henning Vahlenkamp from Matawan, New Jersey, provides this tip for 128 owners who do a lot of BASIC programming in 64 mode. To move from 128 mode to 64 mode without losing the current BASIC program, simply enter these two POKES after executing the computer's GO 64 command.

POKE 43,1
POKE 44,28

These POKE statements tell the 64 portion of your computer that the current BASIC program is located in memory starting at 7169 (\$1C01). That's the default location where BASIC programs are stored when your computer is in 128 mode. □

Here are some readers' programs for adding vectors, bouncing screens, and protecting programs

DATABASE

By Todd Piltingsrud

With DataBase you can store practically any type of information to disk and then retrieve or edit it as you like. DataBase has a powerful screen editor that operates like a conventional word processor, so it can be used for a variety of tasks.

DataBase consists of a BASIC program and a short machine language routine. To enter the BASIC program, use The Automatic Proofreader to help avoid typing errors. Look for Proofreader elsewhere in this section. Be sure to save a copy of the program before you run it.

Enter the machine language routine with MLX, our machine language entry program, which can be found elsewhere in this section. When MLX prompts, reply with the following addresses.

Starting address: C000

Ending address: C397

Be sure to save this program with the filename DATA.ML to the same disk that contains the BASIC portion. The BASIC program automatically searches for and loads that filename.

Using the Program

After loading and running DataBase, use the cursor keys and the Return key to move around on the menu screen and select the various options. The first time you run the program, you'll probably want to create an entry. Cursor to this option and press Return.

Note the difference between an entry and a file on the menu. A file is made up of several entries. For example, you could have numerous entries listing the names, addresses, and telephone numbers of your friends. Taken as a whole, these entries could then be saved as a file, perhaps with the filename FRIENDS.

When you create an entry, the screen clears, and the program goes to input mode. DataBase doesn't ask for a title for an entry. Instead, the first line of each entry acts as its title, but this line is still seen as part of the entry. Once you have entered the information you wish, press f7 to return to the menu. If you wish to create additional entries at this time, simply press Return with the cursor on the Create Entry op-

tion. After typing in several entries, you can press f1 or f3 to move up and down through the entries in the file.

After you have entered several entries, you can then save them under one filename. To do this, select the Save File option from the menu. You'll then be asked for a filename. Suppose we used FRIENDS as suggested earlier. This sequential file will then be saved to disk with all of the information entered so far.

From the DataBase menu, you can load a file back into memory, see a disk directory, scratch files, print files, and list or print all of the entries in a file. You can also recall, erase, or print individual entries within a larger file.

Once you have loaded a file and you want to recall a specific entry, select the Recall Entry option. You'll be asked for a name. Suppose you want the entry that contains Jack Johnson's information, simply type *J* or *JACK*. If you have several friends in the file whose names are Jack, simply enter the full name of the entry you want.

Entries are alphabetized by the first word on the line. Should you wish to add a new name to your FRIENDS file, load the file and select the Create Entry option to add new information. Just remember to save the file again when you have finished editing. You can use the same filename since DataBase lets you overwrite the old file.

Defaults

DataBase is set to handle up to 60 entries and 20 lines per entry. This default can be changed if you desire. Load DataBase, but before running it, list line 10. Notice that W equals the number of entries and H equals the number of lines per entry. By changing these values, you can decrease or increase the size of DataBase's memory. However, W can be no more than 255.

A warning is also in order here. The 64's memory has limits. Putting in numbers that are too high can lead to difficulties such as garbage collecting. This occurs when the 64 has to erase old memory to make room for new information. In an extreme case, you could run out of memory. Due to the 64's memory limitations, a practical limit for DataBase should be 50-100 entries and 15-20 lines per entry. This as-

sumes that you probably won't fill each individual entry to its limit.

Printing

DataBase is also set so that the device number is 8 and the printer number is 4. These numbers can also be changed if you desire. Before running, list line 5. Here, D is the device number and P is the printer number. By changing these numbers, DataBase can be made to access other disk drives and printers.

If changes are made to these variables, be sure to save a copy of DataBase to avoid having to change them each time you load the program.

DATABASE

```

BM 0 REM COPYRIGHT 1993 -COMPU
TE PUBLICATIONS INTL LTD
{SPACE}- ALL RIGHTS RESER
VED
GS 5 D=8:P=4:REM DEVICE AND PR
INTER
SM 10 W=60:H=20:REM NUMBER OF
{SPACE}ENTRIES AND NUMBE
R OF LINES PER ENTRY
PX 15 POKE650,128:POKE53265,0:
POKE53281,6:POKE53280,6
BJ 20 IFPEEK(49152)<>76THENLOA
D"DATA.ML",D,1
EH 25 K=49152:DR=49155:IN=4915
8:AL=49161:EE=49164:CM=4
9167:BF=49170:LF=49173
QF 30 J=H+1:DIMARS(W+1,H+1),T$
(12)
AX 35 N$="" :ARS(1,0)="" :X=4:Y=
5:T=1
EC 40 FORA=1TO12:READT$(A):NEX
T
FK 45 POKE198,0:N$="" :PRINT"
{CLR}{DOWN}{CYN}"CHR$(14
)TAB(15)"DATABASE{DOWN}"
CQ 50 PRINTTAB(4)"{A}*****
*****{S}
"
SX 55 FORA=1TO6:PRINTTAB(4)"
{CYN}-{7}T$(A)TAB(23)T$(
A+6)TAB(35)"{CYN}-:NEX
T
JS 60 PRINTTAB(4)"{CYN}{Z}****
*****
**{X}":POKE53265,27:GOTO
100
SJ 65 GETA$:IFA$=""THEN65
BQ 70 IFA$=CHR$(13)THENPOKE781
,12:POKE782,0:POKE783,0:
SYS65520:PRINT"{7}";:GOT
O110
AB 75 PRINTTAB(Y)"{7}T$(T)
KK 80 IFA$="{UP}"ANDX>4THENX=X
-1:T=T-1
BB 85 IFA$="{DOWN}"ANDX<9THENX
=X+1:T=T+1

```

PROGRAMS

```

MM 90 IFA$="{LEFT}"ANDY=23THEN
Y=5:T=T-6
MA 95 IFA$="{RIGHT}"ANDY=5THEN
Y=23:T=T+6
HK 100 POKE781,X:POKE782,Y:POK
E783,0:SYS65520:PRINTTA
B(Y) "{WHT}"TS(T) "{UP}":
GOTO65
MP 105 PRINT "{CLR}";:END
RR 110 ONTOTO125,175,565,210,
620,650,730,760,590,635
,160,105
BX 115 GOTO65
EJ 120 REM LOAD FILE
SM 125 NN$="":INPUT"FILENAME";
NN$:IFNN$=""THEN45
EA 130 SYSCM:OPEN1,D,15:OPEN8,
D,8,NN$+"",S,R":INPUT#1,
A,B$,B,C:IFA<>0THEN710
QH 135 FORA=1TOW+1:SYSIN:AR$(A
,0)=A$:IFLEN(A$)=0THENC
LOSE1:CLOSE8:GOTO810
KJ 140 FORB=1TOJ:SYSIN:AR$(A,B
)=A$:IFLEN(A$)=0ANDST=0
THENNEXTA:GOTO810
EE 145 IFST=0THENNEXTB:NEXTA:G
OTO810
EQ 150 AR$(A+1,0)="" :CLOSE1:CL
OSE8:GOTO45
SR 155 REM CLEAR MEMORY
SR 160 PRINT"ARE YOU SURE? Y/N
":WAIT198,1:IFPEEK(631)
=89THENRUN
MC 165 GOTO45
BH 170 REM RECALL
PS 175 INPUT"NAME";N$:IFN$=""T
HEN45
DM 180 IFRIGHT$(N$,1)=""*THENN
$=LEFT$(N$,LEN(N$)-1)
PE 185 FORA=1TOW:IFAR$(A,0)=""
THENN$="" :GOTO800
GC 190 IFLEFT$(AR$(A,0),LEN(N$
))<>N$THENNEXT:GOTO800
BQ 195 PRINT "{CLR}"AR$(A,0);:F
ORB=1TOH:IFB<25THENPRIN
TCHR$(13)AR$(A,B);:NEXT
DA 200 GOTO215
FH 205 REM CREATE ENTRY
PE 210 PRINT "{CLR}";:FORA=1TOW
:IFAR$(A,0)<>""THENNEXT
:GOTO810:REM FIND END O
F FILE
EM 215 PRINT "{HOME}";:B=0:SX=0
CS 220 SYSK:GOSUB485
DR 225 ONPEEK(2)GOTO235,510,26
5,285,310,325,335,350,4
00,285,445,465,470,510
HG 230 REM LEFT
SJ 235 IFCX<0THEN510
BR 240 IFB=0THEN220
SP 245 GOSUB485:SYSLF:AR$(A,B)
=N$
BK 250 IFB=6THENSX=6-1:B=6-1
:GOSUB495:PRINTA$A$;:GO
TO220
GD 255 B=6-1:GOSUB500:PRINTA$A
$;:GOTO220
XH 260 REM UP
FS 265 IFB=0THEN220
GD 270 GOSUB485:SYSLF:AR$(A,B)
=N$:IFB=6THENSX=6-1:B
=6-1:GOSUB495:PRINTA$;:
GOTO220
KC 275 B=6-1:GOSUB500:PRINTA$;
:GOTO220
SX 280 REM DOWN, SHIFTED RETUR
N
SQ 285 IFB=HTHEN220
BC 290 SYSLF:AR$(A,B)=N$:GOSUB
500
PJ 295 IFCY=24THENSX=6+1:B=6+
1:PRINTCHR$(13)AR$(A,B)
;:GOSUB500:GOTO220
MD 300 B=6+1:GOSUB500:PRINTA$;
:GOTO220
HS 305 REM CLR/HOME (GO TO BOT
TOM)
CX 310 SYSLF:AR$(A,B)=N$:FORB=
0TOJ:IFAR$(A,B+1)<>""TH
ENNEXT
AE 315 SX=B:GOSUB495:PRINT"
{HOME}";:GOTO220
RP 320 REM HOME
XC 325 SYSLF:AR$(A,B)=N$:B=0:S
X=B:GOSUB495:PRINTA$;:G
OTO220
QH 330 REM INSERT
QD 335 GOSUB485:SYSLF:AR$(A,B)
=N$:GOSUB500:IFLEN(AR$(
A,B))=39THEN220
EP 340 GOTO515
PC 345 REM DELETE
HH 350 FL=1:IFCX<0THEN510
XE 355 IFB=0THEN220
FH 360 IFB=6THENSX=6-1:PRINT
" {DOWN}";:GOSUB485:GOSU
B495
DJ 365 SYSLF:AR$(A,B)=N$:IFLEN
(AR$(A,B-1))=39THENAR$(
A,B-1)=LEFT$(AR$(A,B-1)
,38)
DJ 370 A$=LEFT$(AR$(A,B),39-LE
N(AR$(A,B-1)))
DB 375 AR$(A,B)=RIGHT$(AR$(A,B
),LEN(AR$(A,B))-LEN(A$)
)
EG 380 IFAR$(A,B)=""THENFORU=B
TOH:AR$(A,U)=AR$(A,U+1)
:NEXT
FE 385 B=6-1:CY=CY-1:GOSUB500:
PRINTAR$(A,B);:GOSUB485
:PRINTA$;:SYSLF:AR$(A,B)
=N$
DQ 390 GOSUB495:GOTO220
BA 395 REM RETURN
KD 400 IFB=HTHEN220
CG 405 FL=1:IFAR$(A,H)<>""THEN
290
AS 410 IFCY=24THENSX=6+1
FB 415 GOSUB485:SYSLF:AR$(A,B)
=N$
XB 420 FORU=HTOB+1STEP-1:AR$(A
,U)=AR$(A,U-1):NEXT:REM
INSERT
FC 425 B=6+1:GOSUB500:SYSBF:AR
$(A,B)=N$
AX 430 AR$(A,B-1)=LEFT$(AR$(A,
B-1),LEN(AR$(A,B-1))-LE
N(AR$(A,B)))
DK 435 PRINT:GOSUB485:GOSUB495
:GOTO220
XQ 440 REM F1
CP 445 IFA=1THEN220
FP 450 IFFL=0THEN545
JF 455 FL=0:SYSLF:AR$(A,B)=N$:
GOTO530
JF 460 REM F3 AND F7
EB 465 IFAR$(A+1,0)=""THEN220
RJ 470 IFFL=0THEN545
AG 475 FL=0:SYSLF:AR$(A,B)=N$:
GOTO530
XE 480 REM SAVE CURSOR LOCATIO
N
MP 485 POKE783,1:SYS65520:CX=P
EEK(782):CY=PEEK(781):R
ETURN
XE 490 REM REDRAW SCREEN
SG 495 POKE212,0:PRINT "{CLR}"A
R$(A,SX);
SG 496 FORU=6+1TOSX+24:IFU<>J
THENPRINTCHR$(13)AR$(A,
U);:NEXT
XB 500 POKE783,0:POKE782,CX:PO
KE781,CY:SYS65520:RETUR
N
CG 505 REM PRINT TO SCREEN
AP 510 FL=1:IFCX=38ANDB=HTHENP
RINTA$ "{LEFT}";:GOTO220
QQ 515 PRINTA$;:GOSUB485:IFCX=
39THENSYSLF:AR$(A,B)=N$
:PRINT:B=6+1
EC 520 GOTO220
JG 525 REM ALPHABETIZE IT
XB 530 B=0:FORU=0TOH:IFAR$(A,U
)=""THENNEXT:GOTO540
AJ 535 N$=AR$(A,U):AR$(A,U)=""
:AR$(A,B)=N$:B=6+1:NEXT
HG 540 SYSAL
RA 545 IFA$="{F1}"ANDA<>1THENA
=A-1:GOTO195
HE 550 IFA$="{F3}"ANDAR$(A+1,0
)<>""THENA=A+1:GOTO195
DM 555 GOTO45
HX 560 REM LIST ENTRIES
AC 565 FORA=1TOW:IFAR$(A,0)=""
THEN815
HP 570 PRINT:FORB=0TOH:IFAR$(A
,B)<>""THENPRINTAR$(A,B
):NEXTB
AA 575 IFPEEK(203)<>64THEN575
AM 580 NEXTA:GOTO810
SD 585 REM ERASE ENTRY
RE 590 INPUT"NAME";N$:IFN$=""T
HEN45
BX 595 IFRIGHT$(N$,1)=""*THENN
$=LEFT$(N$,LEN(N$)-1)
QR 600 FORA=1TOW+1:IFAR$(A,0)=""
THENN$="" :GOTO800
MJ 605 IFLEFT$(AR$(A,0),LEN(N$
))<>N$THENNEXT:GOTO800
FG 610 AR$(A,0)="" :SYSEE:GOTO4

```

```

5
MG 615 REM DIRECTORY
KF 620 POKE186,D:SYSDR:PRINT:G
OTO815
DJ 625 IFB=0THEN810
XK 630 REM SCRATCH FILE
SX 635 INPUT"FILENAME";N$:IFN$
="THEN45
HM 640 OPEN1,D,15,"S0:"+N$:CLO
SEL:GOTO45
GG 645 REM SAVE FILE
FQ 650 CLOSE1:CLOSE8:NN$="" :PO
KE198,0:REM NO REPLACE
DP 655 IFRIGHT$(NN$,1)=""*THEN
NN$=""
RM 660 IFNN$=""THENINPUT"FILEN
AME";NN$:IFNN$=""THEN45
GJ 665 OPEN1,D,15:OPEN8,D,8,"
+NNS+",S,W":INPUT#1,A,B
$,B,C
XP 670 IFA=63THENCLOSE8:PRINT"
REPLACE "NN$"? Y/N":WAI
T198,1:IFPEEK(631)<>89T
HEN650
PJ 675 IFA=63THENOPEN8,D,8,"@0
:"+NNS+",S,W":INPUT#1,A
,B$,B,C
SP 680 IFA<>0THEN710
JX 685 FORA=1TOW+1:PRINT#8,AR$(
A,0):IFAR$(A,0)=""THEN
CLOSE1:CLOSE8:GOTO45
GD 690 FORB=1TOJ:PRINT#8,AR$(A
,B):IFAR$(A,B)<>""THENN
EXTB
XX 695 NEXTA
XH 700 CLOSE1:CLOSE8:GOTO45
MB 705 REM DRIVE STATUS
JP 710 PRINTA;B$;B;C:CLOSE1:CL
OSE8:GOTO815
KD 715 REM QUIT
KC 720 PRINT"{CLR}";:END
CJ 725 REM PRINT FILE
DG 730 PRINT"PRESS RETURN TO C
ANCEL"
GX 735 OPEN1,P,7:FORA=1TOW:IFA
R$(A,0)=""THEN750
CH 740 PRINT#1:FORB=0TOH:IFAR$(
A,B)<>""THENPRINT#1,AR
$(A,B):NEXTB
JG 745 GETA$:IFAS<>CHR$(13)THE
NNEXTA
FD 750 CLOSE1:GOTO815
XS 755 REM PRINT ENTRY
DM 760 INPUT"NAME";N$:IFN$=""T
HEN45
XE 765 IFRIGHT$(N$,1)=""*THENN
$=LEFT$(N$,LEN(N$)-1)
DD 770 FORA=1TOW:IFAR$(A,0)=""
THENN$="" :GOTO800
MX 775 IFRIGHT$(AR$(A,0),LEN(N$
))<>N$THENNEXTA:GOTO800
EM 780 PRINT"PRESS RETURN TO C
ANCEL"
BP 785 OPEN1,P,7:PRINT#1:FORB=
0TOH:IFAR$(A,B)<>""THEN
PRINT#1,AR$(A,B)
JG 790 GETA$:IFAS<>CHR$(13)THE

```

```

NNEXT
KE 795 CLOSE1:GOTO815
FD 800 PRINT"NOT FOUND, ":GOTO
815
SF 805 CLOSE1:CLOSE8:PRINT"FIL
E NOT COMPATIBLE, ":ARS
(1,0)="" :NN$="" :GOTO815
KM 810 PRINT"FULL FILE, ";
HB 815 POKE198,0:PRINT"{WHT}PR
ESS ANY KEY":WAIT198,1:
GOTO45
BQ 820 DATA LOAD FILE,RECALL E
NTRY,LIST FILE,CREATE E
NTRY,DIRECTORY,SAVE FIL
E
SS 825 DATA PRINT FILE,PRINT E
NTRY,ERASE ENTRY,SCRATC
H FILE,CLEAR MEMORY,QUI
T

```

DATA.ML

```

C000:4C A5 C0 4C 6D C1 4C 33 2C
C008:C1 4C CC C1 4C D6 C2 4C C2
C010:A2 C2 4C 1F C0 38 20 F0 27
C018:FF 18 A0 00 20 F0 FF 20 98
C020:88 C0 84 02 A0 26 A9 20 D7
C028:D1 05 D0 05 88 C4 02 10 A9
C030:F7 18 A5 02 65 05 05 D7
C038:A9 00 65 06 85 06 38 C8 19
C040:98 E5 02 85 02 20 F4 B4 4F
C048:A6 05 A4 06 20 88 B6 A2 86
C050:02 20 5B C1 A5 02 F0 2F A8
C058:A0 00 84 06 B1 33 85 05 85
C060:29 3F 06 05 24 05 10 02 AE
C068:09 80 90 04 A6 06 D0 04 D3
C070:70 02 09 40 C9 22 D0 08 50
C078:A5 06 49 01 85 06 A9 22 41
C080:91 33 C8 C4 02 D0 D5 60 5C
C088:38 20 F0 FF 8A 85 05 0A CA
C090:0A 65 05 85 05 A9 00 06 3E
C098:05 2A 06 05 2A 06 05 2A D5
C0A0:69 04 85 06 60 A2 00 09 96
C0A8:08 C1 B1 03 D0 11 A9 01 24
C0B0:20 F4 B4 A0 04 A5 34 91 D0
C0B8:03 88 A5 33 91 03 88 A9 19
C0C0:01 91 03 C8 B1 03 AA C8 CB
C0C8:B1 03 85 04 86 03 20 88 DD
C0D0:C0 B1 05 09 80 91 05 A2 47
C0D8:00 86 CC 86 D4 86 D8 20 90
C0E0:E4 FF F0 FB 48 20 88 C0 47
C0E8:A2 02 86 CD B1 05 30 FC E8
C0F0:86 CC 29 7F 91 05 68 A0 18
C0F8:00 91 03 C8 C0 0E F0 05 F0
C100:D9 84 C3 D0 F6 84 02 60 45
C108:A5 2D 85 03 A5 2E 85 04 7F
C110:A0 00 B1 03 DD 81 C3 F0 B7
C118:10 18 A9 07 65 03 85 03 94
C120:A9 00 65 04 85 04 4C 10 4A
C128:C1 C8 B1 03 DD 82 C3 D0 76
C130:E8 C8 60 A2 08 20 C6 FF DE
C138:A0 00 20 CF FF 99 00 02 75
C140:C9 0D F0 05 C8 C0 28 D0 C4
C148:F1 20 CC FF 98 85 02 20 65
C150:F4 B4 A2 00 A0 02 20 88 A5
C158:B6 A2 00 20 08 C1 A5 02 76
C160:91 03 C8 A5 33 91 03 C8 8F
C168:A5 34 91 03 60 A5 BA AA E7
C170:A0 00 20 BA FF A9 02 A2 41
C178:7F A0 C3 20 BD FF 20 C0 4D

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C180:FF A6 BA 20 C6 FF A9 0D 9D
C188:20 D2 FF A0 04 20 A5 FF C6
C190:88 10 FA 48 20 A5 FF A8 80
C198:68 AA 98 A4 90 D0 20 A0 01
C1A0:06 84 D3 20 CD BD E6 D3 CB
C1A8:20 A5 FF 20 D2 FF D0 F8 D8
C1B0:A9 0D 20 D2 FF A5 C5 C9 69
C1B8:40 D0 FA A0 02 D0 CE A5 90
C1C0:BA 20 C3 FF 20 CC FF A9 FF
C1C8:00 85 C6 60 20 D6 C2 A0 0F
C1D0:08 B1 2F A8 88 88 84 FD A2
C1D8:18 A9 09 65 2F 85 FB A9 7B
C1E0:00 65 30 85 FC A5 FD 85 1C
C1E8:71 A9 00 85 FF 18 A9 03 9E
C1F0:65 FB 85 FC 85 03 A9 00 22
C1F8:65 FC 85 FC 85 04 A0 00 6C
C200:B1 03 F0 3E A0 03 D1 03 D8
C208:90 04 B1 03 F0 34 85 02 A2
C210:C8 B1 03 85 05 C8 B1 03 D0
C218:85 06 A0 02 B1 03 AA 88 8D
C220:B1 03 85 03 86 04 88 B1 27
C228:03 D1 05 90 11 D0 1C C8 1A
C230:C4 02 D0 F3 A0 03 B1 FB 62
C238:A0 00 D1 FB 90 0D C6 71 BF
C240:D0 AB A5 FF F0 04 C6 FD F0
C248:D0 8E 60 A2 00 A0 08 84 27
C250:FF B1 2F 85 9E 86 9F 0A D8
C258:26 9F 65 9E 85 9E 90 02 39
C260:E6 9F A0 06 B1 2F A8 88 D9
C268:84 72 A5 FB 85 03 A5 FC C1
C270:85 04 18 A9 03 65 03 85 90
C278:05 A9 00 65 04 85 06 A0 24
C280:02 B1 03 AA B1 05 91 03 46
C288:8A 91 05 88 10 F3 18 A5 07
C290:9E 65 03 85 03 A5 9F 65 CA
C298:04 85 04 C6 72 D0 D4 4C 3B
C2A0:3E C2 18 A9 09 05 2F 85 58
C2A8:03 A9 00 65 30 85 04 A0 B0
C2B0:06 B1 2F 85 71 A0 08 B1 B3
C2B8:2F 85 72 A0 00 98 91 03 18
C2C0:18 A9 03 65 03 85 03 A9 51
C2C8:00 65 04 85 04 C6 72 D0 71
C2D0:EC C6 71 D0 E0 60 A2 00 87
C2D8:A0 08 B1 2F A8 85 9E 86 F8
C2E0:9F 0A 26 9F 65 9E 85 9E C6
C2E8:90 02 E6 9F 88 84 02 18 80
C2F0:A9 0C 65 2F 85 03 A9 00 79
C2F8:65 30 85 04 A0 00 B1 03 99
C300:F0 12 18 A9 03 65 03 85 5B
C308:03 A9 00 65 04 85 04 C6 D6
C310:02 D0 EB 60 C6 02 F0 4A BA
C318:A5 03 85 FB A5 04 85 FC E8
C320:A0 06 B1 2F 85 71 18 A9 6E
C328:03 65 03 85 05 A9 00 65 77
C330:04 85 06 A0 02 B1 05 91 58
C338:03 88 10 F9 18 A5 9E 65 FE
C340:03 85 03 A5 9F 65 04 85 85
C348:04 C6 71 D0 D9 18 A9 03 44
C350:65 FB 85 FB 85 03 A9 00 85
C358:65 FC 85 FC 85 04 C6 02 1E
C360:D0 BE A0 06 B1 2F 85 02 CB
C368:A0 00 98 91 FB 18 A5 9E 96
C370:65 FB 85 FB A5 9F 65 FC 8D
C378:85 FC 62 D0 EA 60 24 12
C380:30 41 80 4E 80 9D 1D 91 AB
C388:11 93 13 94 14 0D 8D 85 9E
C390:86 88 00 00 00 00 00 00 7D

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dia College in Moorhead, Minnesota.

PROGRAMS

BRICK LAYER

By Maurice Yanney

You're the mason who has to repair holes in a brick wall. To make matters more interesting, each hole requires a brick of a certain color. For an additional twist, the wall you have to repair is moving, and the bricks you need are scattered about a maze. How many mazes can you complete in this arcade-style game for the 64?

Typing It In

Brick Layer is written entirely in machine language, but it loads and runs like a BASIC program. To type it in, use MLX, our machine language entry program, which you'll find elsewhere in this section. When MLX prompts, you respond with the following values.

Starting address: 0801

Ending address: 1990

Be sure to save a copy of the program before exiting MLX.

Playing the Game

The object of this game is to fill all of the holes which appear in the wall at the bottom of the screen. The holes are filled by dropping in a brick that has the same color as the area around the hole. Use a joystick in port 2 to move your tank around the various mazes.

I didn't mention the tank? This game has an element of danger as well. Press the fire button to have the tank fire bullets, pick up a brick, or drop a brick.

When your tank is directly over a desired brick, press the fire button to pick it up. You can carry only one brick at a time. When you're carrying a brick, press the fire button again to drop it (unless all of the spaces currently under the tank contain bricks). If your tank isn't carrying a brick and there isn't one immediately beneath it, pressing the fire button will shoot bullets in all directions.

Obstacles

You need the bullets to make the three electric wheelbarrows drop their bricks. Each wheelbarrow is a different color, and each moves about the maze. The wheelbarrows carry bricks

that are the same color as the wheelbarrow. When a wheelbarrow carrying a brick is hit by a bullet, it drops a brick. You want to pick up the dropped brick before the wheelbarrow can retrieve it.

When a wheelbarrow is empty, it moves faster than it does when it is filled. A wheelbarrow can pick up a brick by moving over a brick of the same color or by getting a new one at the maze entrance at the top center of the screen. Wheelbarrows will no longer move to the entrance for new bricks when all bricks of the same color as the wheelbarrow have been brought out onto the maze.

If a wheelbarrow touches any part of the tank, the tank becomes electrified and is destroyed. There are four extra tanks; when all your tanks are destroyed, the game is over. Pressing the fire button will start a new game.

When you pick up a brick, your speed will be reduced, but you want to take it to the bottom of the screen and drop it directly over the hole with the appropriate color. When all the holes are filled, a new maze appears, and you earn a bonus player.

To pause the game, hold down the Shift key or press the Shift Lock key. To continue playing, release the Shift or Shift Lock key.

BRICK LAYER

```
0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 96
0811:20 20 00 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 7E 85 2D A9 1E 85 A1
0839:2E 4C 00 01 12 EA 00 7E 3E
0841:1E 07 18 B9 6E 09 99 E8 74
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0C 20 34 C3
08D1:03 E6 A7 4C 5C 01 E8 20 AF
```

```
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C 0E 08 A4 A8 F0 59
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 0C 88 75
0971:0A 00 9E 20 32 30 36 32 4F
0979:00 00 00 E7 37 21 D0 8D 77
0981:20 40 7A 38 08 19 20 37 A2
0989:69 91 F6 1A A2 8F A0 1D E6
0991:20 17 0D 11 0F CD 79 14 E2
0999:A9 1F C4 0E 8D F7 20 49 97
09A1:A0 22 01 14 DC AD 8D 02 A8
09A9:3A B8 06 1D E2 C1 28 84 8C
09B1:83 F0 0B CE 4E 00 0E E2 81
09B9:A3 51 B9 90 AC C3 B1 F1 FB
09C1:84 A6 20 F8 9D 00 22 03 87
09C9:20 F0 17 20 A4 0D 20 50 F6
09D1:16 20 96 15 B9 39 E2 9A 2E
09D9:E0 FC 01 A1 20 C1 0E 20 1A
09E1:4D 12 50 33 02 C8 10 EC 9C
09E9:4B 10 40 DE A5 1E E8 E0 F3
09F1:03 D0 F3 AD A9 1E F0 2F E9
09F9:1F 73 91 02 53 09 8E C0 67
0A01:20 24 8D 89 0E F0 14 20 F4
0A09:E3 1A AD B5 60 38 3E A6 A1
0A11:0A 20 B4 0C AD 1E D0 E1 F2
0A19:F0 82 EE 06 1B 0A 20 02 C7
0A21:0C 4C 43 08 EA 46 28 84 7C
0A29:C6 69 9D C6 0C 8B 2C 1C 1E
0A31:12 85 22 27 63 1D 4C 20 AE
0A39:09 20 26 09 0E 9E 0A AB D9
0A41:68 08 A0 03 5F C3 C6 08 6F
0A49:62 50 19 71 59 72 A8 01 C3
0A51:CA C1 ED A0 02 DE 61 E5 37
0A59:E9 88 18 A9 06 E5 04 18 0A
0A61:48 8E 71 05 44 AE C1 B1 CD
0A69:0C 20 0C 86 0D 03 70 9F 6A
0A71:32 4A 4A 4A 66 31 10 15 4C
0A79:18 69 55 45 A5 FB 56 28 E4
0A81:85 FB 83 19 E9 08 03 1C FA
0A89:A5 FC 38 E9 D4 A8 A0 00 2F
0A91:85 A2 85 A1 85 A0 60 02 2E
0A99:70 84 2C 06 61 A3 05 01 91
0AA1:90 FA 4C 88 09 A2 08 5E 10
0AA9:1F 9D FF D3 9C 88 10 5F 78
0AB1:19 01 83 03 D0 15 A9 16 77
0AB9:7B 91 41 A2 0F A0 F0 AB CA
0AC1:95 0B A3 A9 33 4C D5 61 4A
0AC9:C3 46 11 A2 F5 A0 EF 6C 6C
0AD1:0D 90 39 0D 21 39 0D C5 56
0AD9:46 46 43 87 3C 3A 73 94 C9
0AE1:00 C1 13 A2 F0 A0 0F D2 ED
0AE9:B2 14 91 08 87 0C 54 FF 24
0AF1:38 ED 98 06 10 11 AA A8 D3
0AF9:A9 13 20 3A A9 04 41 21 50
0B01:19 8D 01 7B 11 81 A2 FF B2
```

0B09:A0	FF 4C 35 C0 15 04 D4 83	0D39:0E	8C A7 8C AA 1E 8C 09 2B	0F69:38	ED 93 01 26 90 29 C8 30
0B11:8E	05 D4 8C 06 D4 A9 0A F3	0D41:D0	A9 58 9D 8A CB 38 1A 21	0F71:BF	A0 CD 85 AD 4A E6 08 16
0B19:8C	4F 14 6D 18 D4 49 11 5A	0D49:9D	01 35 0B 9D 99 D6 A5 70	0F79:C9	6A 07 20 CD AA A4 04 60
0B21:0A	94 8E B4 80 08 B5 88 96	0D51:1E	01 19 0D 91 03 0E E8 4C	0F81:C9	04 3E DF F9 60 2C 32 27
0B29:B9	1E A0 04 2D A2 02 D1 C1	0D59:38	84 DF 3B 85 9F 4D E4 8A	0F89:00	CD 84 1E B0 0F 5B 87 8D
0B31:B9	BA B3 90 28 B3 10 CA 4D	0D61:8C	08 EA 14 20 FC 14 A0 20	0F91:02	1C 82 C6 20 B0 E2 1C 1A
0B39:CF	42 75 CE 42 D2 3C 0B 44	0D69:27	A9 A0 8D E7 20 17 98 F4	0F99:AD	95 1E 29 01 72 9B 8A DD
0B41:DA	A0 1B 79 0B 19 10 A2 67	0D71:07	99 00 04 D0 01 C3 F5 BD	0FAL:B7	20 DC 10 54 8C FE 67 7A
0B49:2B	59 15 41 09 A9 10 A5 B6	0D79:A9	66 8D 13 15 14 10 47 45	0FA9:A5	8B 59 D9 F0 03 71 A8 65
0B51:54	A9 82 50 53 41 D0 B4 47	0D81:15	04 A2 73 00 10 87 6A 6C	0FB1:F0	FE 59 29 A8 48 83 63 96
0B59:A2	88 A0 1C 4C 17 0D 06 97	0D89:1D	87 A2 18 AD 03 18 20 B3	0FB9:0E	E9 B6 16 AA 6F 03 1E C8
0B61:57	0B C2 A5 C0 2B 3E 8A 52	0D91:0A	E5 A9 74 A0 1E 20 1E 82	0FC1:83	A9 02 A0 1C 2A DE 7C 1A
0B69:84	F0 F9 20 88 4C 41 C8 FF	0D99:AB	E4 C7 8D B6 40 15 85 FA	0FC9:38	00 0C 50 08 91 27 07 66
0B71:61	39 36 2D 08 A5 A2 C9 06	0DA1:48	B7 81 6C 87 8A B8 1E BA	0FD1:09	99 26 7A 64 22 1A 99 C0
0B79:16	90 ED EE 2A FE A8 86 90	0DA9:60	8C FD 0E 8E 4E BC D1 B0	0FD9:0A	3B 90 40 BF C5 0C 06 15
0B81:4C	78 C0 E4 53 90 20 F3 53	0DB1:F0	07 AD 94 89 5B 70 0E AD	0FEL:58	BC F0 C0 80 45 10 BB 7A
0B89:0A	4C B8 0A 8D 02 08 8C 80	0DB9:CE	03 FE 22 D0 82 21 51 22	0FE9:C9	0D 90 F3 B3 AC EF 39 EA
0B91:63	55 A0 1E 4C 1E AB A0 77	0DC1:C0	0E DB 3C FF 84 41 8D 21	0FF1:8A	83 2A D2 B0 E2 0F 08 DF
0B99:15	A9 20 99 C7 07 68 73 E0	0DC9:21	14 F0 0D 20 3B 75 5A 9B	0FF9:24	E3 26 11 EA 33 8C 41 77
0BA1:43	FA 60 F2 06 A2 AC 29 90	0DD1:08	A9 08 58 C6 86 01 4F 82	1001:D0	D0 CD B9 E3 F0 C8 20 A7
0BA9:1E	13 00 83 53 D4 D8 E1 4D	0DD9:46	08 93 31 04 4F C6 86 10	1009:C8	58 D0 C1 3C 8E 1A 90 BA
0BB1:49	32 8D 02 8E 98 8D 04 C0	0DE1:02	4F 46 CF 93 31 02 4F 4B	1011:02	BE E0 5C 55 A1 60 6C 9E
0BB9:C0	08 FF 8D 06 8C 00 7C E9	0DE9:46	1C 85 C9 03 F0 F1 CD 09	1019:40	DE AB 9C 52 14 17 4C AD
0BC1:10	D0 A9 1A D0 77 88 A6 07	0DF1:91	11 50 DC 11 04 60 64 AE	1021:38	B0 27 C6 23 19 48 72 5B
0BC9:C1	03 11 05 10 18 A8 00 26	0DF9:84	EE 83 08 AD 96 D0 67 D3	1029:15	1A 8A 20 19 12 A8 AD BD
0BD1:47	20 3C 2A 90 12 C9 DA F8	0E01:A1	18 1B 34 29 C5 4A 1D AC	1031:78	51 40 A2 38 98 60 AB A1
0BD9:B0	0E 38 E9 2A 29 07 C9 3F	0E09:34	73 F4 C4 61 20 20 10 E2	1039:F0	C0 65 C3 E3 C9 3A B0 56
0BE1:07	F2 79 E6 06 20 1C 1B D9	0E11:D4	29 0B 97 0E 31 C9 40 C5	1041:CC	D4 40 2B 0E 0B 8D 51 C0
0BE9:20	11 0A 11 FC 51 08 77 5B	0E19:50	0F 71 D0 04 C6 83 20 BD	1049:85	EA 0A C9 10 E2 34 A0 D9
0BF1:C3	FF 90 CB B3 01 1D D0 65	0E21:C9	80 D1 43 1C 15 81 51 3A	1051:A0	4C B2 11 FB 01 94 89 D2
0BF9:8D	17 D0 AD 9A 00 82 83 EE	0E29:93	C9 C0 B0 0C E9 0E 74 3D	1059:62	4C B9 11 CA 78 45 A8 71
0C01:15	D0 60 A3 2B A9 FE E0 B4	0E31:78	64 4C 03 1D 0B 19 7A 1E	1061:90	06 A9 06 5E 85 C9 06 83
0C09:F2	A9 0F 49 CD 29 78 C0 5B	0E39:A0	91 33 8A CD 38 06 01 75	1069:90	3C 5D AB 9D A0 4E A1 C4
0C11:03	2C 40 09 2C 75 A8 14 EA	0E41:62	F9 10 50 7D 03 03 4C 5E	1071:AC	8E F7 3A 10 E2 C0 20 DB
0C19:1A	F1 A2 05 D2 A8 54 78 B9	0E49:B0	10 4C DC 10 C1 0F 8B 4A	1079:68	30 C0 A1 08 CD 0B 0F A8
0C21:A0	54 29 D0 E9 F8 A1 03 4A	0E51:87	42 AD 55 06 E1 A1 28 EF	1081:18	B3 09 47 04 8C 18 05 B7
0C29:08	4A 1D 27 80 F3 21 27 2B	0E59:AD	15 02 38 CE 90 3C AD 34	1089:B9	41 02 2D 64 12 AC E0 8F
0C31:03	CD C9 1D 26 77 B8 EB B5	0E61:C9	03 6B 5A 4C 9B 56 20 D3	1091:54	C8 44 08 D0 EC 60 03 15
0C39:60	D3 A9 FF 03 41 07 08 DE	0E69:A1	11 EE 9D 90 D1 F0 68 68	1099:67	A2 25 16 16 C0 45 20 7A
0C41:44	71 F4 D1 44 A2 04 90 D8	0E71:D8	27 69 C8 27 B0 15 6B 0F	10A1:7F	12 B8 1D C1 F0 EA 60 F6
0C49:94	9D 70 DB E8 E8 E8 D0 6C	0E79:88	19 C7 AB A8 1D 07 C8 64	10A9:2A	12 39 7C 36 52 90 1E 8C
0C51:6C	80 02 A0 0E 20 28 1B 09	0E81:6A	B5 FD D0 0B C3 05 A1 20	10B1:AA	16 20 24 03 DD 08 90 23
0C59:56	20 D0 1A EE E4 46 20 15	0E89:1E	B8 2D 8C 8C 79 A9 1C 69	10B9:13	BD C3 1A C0 A5 90 0B B5
0C61:8D	E6 07 59 06 25 4C 19 E6	0E91:A0	4D C0 A5 B9 27 0A A9 EB	10C1:42	18 69 02 DD 2D 75 C0 A5
0C69:60	6C 64 90 05 E4 D9 1C ED	0E99:FD	C1 86 D0 EA 02 36 43 D5	10C9:03	88 8B 03 7D AD 2C D0 7D
0C71:41	00 BD 45 34 20 CD BD B1	0EA1:47	15 4E C0 18 1E C0 18 4F	10D1:25	9A 11 EA 1B 38 BD 98 C4
0C79:20	BC 1A A9 00 DF F8 1A 3A	0EA9:6D	86 6A 6D A4 6D 46 6A 14	10D9:AA	86 CD 1C 1F D0 0D FA BD
0C81:A4	95 05 90 02 3C B2 23 84	0EB1:80	FD 30 B4 01 54 3C 3C EC	10EL:11	38 BE 40 F0 CF EB AE C1
0C89:CA	AA CA BD 46 50 AB 40 F1	0EB9:E8	8A 75 8D 60 66 8D 9A C6	10E9:A4	1E 9D 99 41 91 03 A3 2B
0C91:04	AC A4 AD 40 0A 4B A4 AB	0EC1:48	9C 40 0A 9E 44 0C 04 F3	10FL:36	F0 BF 28 98 62 47 E1 A2
0C99:A9	1E BD 50 00 05 00 20 FE	0EC9:8C	80 8D 9B 21 01 9D 1E 1E	10F9:16	4C E4 0E D8 FB 12 EE 7F
0CA1:20	75 0B AD B4 75 85 06 EF	0ED1:8D	13 EE 9F 20 04 93 F0 98	1101:9F	E5 D2 A0 8F A3 8C 47 3C
0CA9:90	06 38 E9 05 4C 60 84 CF	0ED9:02	0E E2 A8 20 A5 0F D3 2B	1109:2A	8C 84 17 B6 40 A1 58 B7
0CB1:27	00 0E 24 60 48 C2 C6 D1	0EE1:AB	F1 60 6B A9 C9 FF F0 78	1111:DF	18 25 99 46 05 7A 0B AD
0CB9:B1	6C E2 24 6C 14 43 78 17	0EE9:22	C9 28 F0 E0 43 F0 21 B4	1119:02	F0 0C FA C9 E4 F9 DE 5E
0CC1:82	24 64 28 03 06 20 84 28	0EF1:C9	16 F0 14 AB 1B FC A7 2B	1121:D0	DD 20 BE 13 AD 3E 85 64
0CC9:0A	4C 95 0C 20 90 C5 05 41	0EF9:A0	F0 2E 55 FD D9 66 D0 B2	1129:BD	C1 D0 C9 15 D0 1D C5 3D
0CD1:FE	0A A8 AE C0 1E 68 82 BD	0F01:09	E9 3E 8A 0E 21 42 60 68	1131:EA	22 63 43 33 FF 74 FA 6F
0CD9:BA	24 14 E0 85 0B C9 0B DF	0F09:60	A8 B0 88 B8 20 20 E0 87	1139:82	A6 13 72 CD 04 D0 EB DB
0CE1:05	B2 0B 4C 0B 0B DC C9 DD	0F11:35	08 10 A9 2E D0 02 A9 CA	1141:20	72 09 F6 B9 14 35 A0 C9
0CE9:A2	20 D8 0F C0 32 0F C9 1E	0F19:20	8D E0 1E 10 93 98 1E C6	1149:83	CF F6 1C 90 A9 7A BC 9E
0CF1:04	F0 0B 72 33 A2 03 20 1B	0F21:AA	C7 15 A8 F0 1B 5C 8E E6	1151:8B	8E 82 67 08 03 4C D0 59
0CF9:9A	09 CA D0 FA 20 08 0A 7A	0F29:68	90 08 2E F0 95 20 D0 72	1159:4A	FE 10 57 CE A9 32 EC 46
0D01:EE	5A 2E AD 20 35 1F CA A8	0F31:0C	67 98 41 E0 89 86 91 22	1161:93	8E A2 B6 48 1A 8C CF 44
0D09:A8	0E 35 B5 AD C6 C4 8D 9C	0F39:FB	13 1D A2 C6 50 BE 30 0D	1169:CD	79 3E 21 32 3C 3C 8A 30
0D11:CA	AD AA C4 8D CA AD AA 3B	0F41:42	40 39 20 97 E0 A5 8F D4	1171:C9	27 B0 13 C9 26 B0 0A DB
0D19:C4	8D CA 2A 94 8E C8 14 79	0F49:29	0F F0 30 1F F7 2B 8A 9A	1179:C9	25 B0 01 94 2B 8D 36 92
0D21:B4	C4 3B D3 52 07 E0 06 E1	0F51:83	38 FD 92 2E 42 25 44 31	1181:10	40 50 38 C0 44 C1 AD 91
0D29:0E	79 15 7E 19 20 A3 09 CC	0F59:29	F0 1D 2E DF FD 60 58 DE	1189:B0	40 AB B1 C5 08 B2 1E 76
0D31:4C	91 09 20 E2 19 C9 81 89	0F61:80	09 90 39 93 88 F0 31 79	1191:6D	B3 1E D0 05 00 5F 97 A6

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1199:6F	30	83	08	1E	0C	02	F4	13C9:A4	01	64	EA	8C	17	4C	83	9A	15F9:77	4C	EB	19	D5	15	64	4C	1A		
11A1:A9	0C	D6	89	48	3C	8C	01	5C	13D1:17	AD	83	E0	AD	10	40	21	BC	1601:40	41	06	C8	B1	FD	84	FD	77	
11A9:23	62	2B	A7	13	F5	70	0C	33	13D9:11	DE	F3	44	E4	14	10	0B	A5	1609:C8	8C	83	74	B3	C0	71	AE	A6	
11B1:85	A0	06	06	E6	16	F0	19	6A	13E1:0E	AD	80	70	0D	EA	F3	34	C1	1611:0F	07	BC	E0	09	0A	87	58	04	
11B9:B0	5C	0A	83	1B	E4	DC	A9	94	13E9:F0	14	AD	C0	03	CD	01	1D	BD	1619:C0	06	F0	CA	D0	F2	60	AE	B3	
11C1:21	D2	4C	59	FB	96	20	1C	DE	13F1:08	7F	0F	F6	14	4C	FC	14	4B	1621:B6	29	AC	32	20	0A	1B	AC	B7	
11C9:08	78	D0	F0	15	A8	1E	20	DE	13F9:B6	63	56	9E	8E	44	7A	3A	BD	1629:84	11	A9	A0	34	05	88	5A	3C	
11D1:DE	72	1E	8D	A0	28	CE	00	DF	1401:41	72	3A	47	A4	4A	43	3A	31	1631:AD	D0	F7	12	16	EC	20	EC	1A	
11D9:60	98	48	22	BF	68	A8	B1	20	1409:EE	74	E9	A8	84	A7	23	81	18	1639:EC	AD	48	4A	21	03	0F	85	AD	
11E1:FD	CA	85	F7	60	A0	3E	38	20	1411:A7	87	43	3A	8A	A4	A9	80	B5	1641:44	C1	01	12	CE	3B	05	20	CE	
11E9:8D	80	B5	E4	88	60	94	D1	B8	1419:A2	E0	A0	F8	4C	92	17	A9	F2	1649:42	1A	EE	98	50	18	38	ED	C5	
11F1:38	24	02	77	68	00	20	55	C9	1421:01	A2	07	A0	1F	8D	C4	83	99	1651:90	44	7E	C3	00	06	18	6D	98	
11F9:36	0B	8D	F8	3B	8C	27	1C	B1	1429:FA	37	8D	C1	03	8E	C7	03	4F	1659:82	86	00	02	CE	7F	1E	AD	E6	
1201:02	02	8D	28	23	05	8D	29	4C	1431:8C	CA	03	60	70	9C	E5	01	7B	1661:81	1E	8D	80	1E	4C	5F	1A	8A	
1209:30	02	07	8D	2A	D0	A9	0D	74	1439:1E	96	00	1C	96	FE	1D	96	59	1669:CA	5B	20	27	04	47	05	40	CF	
1211:8D	F9	E1	04	0E	8D	FA	46	D9	1441:0A	8F	36	38	D0	6D	FA	A8	77	1671:66	06	24	06	47	72	32	24	C3	
1219:0F	8D	FB	60	21	C5	52	2D	9F	1449:9A	07	2B	D0	A0	00	1C	2F	5F	1679:18	F0	0B	EE	32	09	A9	FC	44	
1221:B3	20	6D	44	68	3C	A0	13	A1	1451:C2	01	10	8C	4B	A1	10	02	E8	1681:E8	21	60	AD	2E	04	C9	01	67	
1229:36	16	D0	0C	19	34	03	A0	09	1459:74	29	EF	D0	86	20	DD	41	86	1689:F0	08	A9	20	AE	E0	05	9D	08	
1231:1C	44	05	B4	8D	FC	07	24	F2	1461:A3	8D	09	D0	DA	AA	C0	D0	C0	1691:C5	07	CE	B5	1E	60	A9	06	63	
1239:60	1B	D0	60	70	05	19	0B	49	1469:0A	81	22	10	72	86	65	18	CC	1699:A0	00	C8	05	D8	44	D9	99	A4	
1241:02	CD	C2	46	41	B1	0B	D0	4E	1471:CE	BA	33	90	01	62	A2	00	F5	16A1:00	DA	99	98	DA	C8	D0	F1	CE	
1249:2C	64	14	2A	15	20	14	15	28	1479:DC	29	0F	8D	75	04	68	1C	BD	16A9:60	8A	85	FB	A9	04	85	FC	7E	
1251:4C	1D	15	A9	40	E4	71	84	1D	1481:8A	25	70	B8	08	C7	A1	F8	6D	16B1:C0	00	F0	06	20	C0	05	FF	CA	
1259:80	7A	10	EA	C0	B1	03	69	49	1489:01	87	3B	4C	08	2E	E8	03	D5	16B9:88	D0	F6	60	A0	27	91	FB	04	
1261:6C	60	24	A3	60	88	2F	87	9D	1491:70	EE	E4	AD	BB	1E	29	01	CE	16CL:88	C0	FF	D0	F9	4C	E4	00	3A	
1269:21	01	07	A5	1D	41	A0	2E	F6	1499:3D	06	20	E8	02	0A	BA	72	94	16C9:7D	04	A8	0C	E4	03	43	3E	83	
1271:4C	5C	14	D1	8F	34	85	38	1C	14A1:46	C0	03	08	22	30	1A	19	1D	16D1:8A	49	B8	81	07	38	00	3B	19	
1279:EE	A6	29	FE	BA	29	52	29	1C	14A9:C9	01	28	0D	B4	18	C9	02	68	16D9:03	0F	06	08	03	1C	A0	A9	FF	
1281:FB	28	05	0E	0A	6C	D0	85	58	14B1:CA	8B	E1	18	4C	7B	18	A9	0A	16E1:04	0D	2A	1C	38	00	0F	0B	45	
1289:FC	CB	85	FD	A9	30	85	FE	C7	14B9:0B	8D	AA	1E	AD	A0	96	8B	AA	16E9:0A	00	1C	0B	00	1E	64	0A	25	B7
1291:67	9D	8C	3D	91	F0	C8	D0	1D	14C1:01	4C	FA	12	97	13	2E	FD	61	16F1:03	80	C0	05	18	CE	99	50	67	
1299:F9	E6	FC	E6	FE	E2	25	10	60	14C9:4C	49	0F	56	B6	C1	C0	0C	FB	16F9:08	BD	07	00	0A	13	14	00	3F	
12A1:D0	F0	A5	C8	5B	85	01	AD	4C	14D1:90	1B	53	7A	64	FC	C4	03	BE	1701:21	13	C2	C3	82	18	00	14	A1	
12A9:1C	09	01	80	0E	DC	AD	01	57	14D9:53	76	47	54	46	59	A7	B0	0F	1709:14	02	22	12	93	81	16	01	F6	
12B1:1F	18	29	F0	69	0C	8D	18	4E	14E1:07	9E	56	C6	41	A0	06	D5	DA	1711:6A	08	B8	E2	07	01	0E	1B	2F	
12B9:D0	08	6F	BD	18	1E	9D	E0	67	14E9:95	8F	53	16	E2	D2	B0	18	68	1719:01	1A	03	30	0C	02	0E	08	3E	
12C1:37	E8	E0	20	D0	F5	60	A2	9B	14F1:97	97	51	12	01	4F	D9	1D	2D	1721:BB	19	08	20	A8	0B	0F	1F	25	
12C9:00	70	CE	2E	76	30	D0	0E	EA	14F9:51	19	25	C5	46	0C	83	1F	6D	1729:A8	0F	03	02	0E	02	02	1E	8A	
12D1:B9	A5	A2	2A	74	BB	15	50	40	1501:C0	A1	B0	1B	A3	1E	19	3F	C2	1731:CA	38	07	13	08	08	5C	16	14	
12D9:43	91	E8	E8	57	CD	E0	60	C3	1509:02	F1	FC	CC	31	00	3F	A0	C5	1739:40	07	42	03	05	19	CD	1F	09	
12E1:64	C9	C4	C9	C0	90	71	20	85	1511:00	3F	C0	07	90	07	25	08	86	1741:5E	BA	81	08	59	00	18	0C	05	
12E9:4E	09	20	5D	C5	0F	85	C2	89	1519:1C	A0	A8	8C	EC	15	4C	F5	A1	1749:11	C2	16	11	22	67	11	01	56	
12F1:A2	03	CB	55	88	06	E0	A8	BD	1521:18	18	4B	C9	0D	90	47	A0	3D	1751:00	93	01	00	1F	15	09	84	68	
12F9:F0	3E	F9	28	16	03	D0	EA	31	1529:B0	1F	6D	17	C0	3B	90	18	BE	1759:2A	1E	60	06	0E	60	03	46	CE	
1301:6D	24	8A	1E	29	03	F0	0B	5C	1531:88	ED	44	20	47	19	D0	08	ED	1761:66	03	9A	0B	27	D9	85	09	3C	
1309:3B	C9	FD	D0	05	20	37	16	39	1539:0B	87	DB	24	00	AC	89	0C	5A	1769:00	05	23	46	18	1E	0A	28	17	
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1321:AE	C2	71	3C	BD	8B	1E	A2	3C	1551:5A	AC	83	05	EE	05	42	1C	C0	1781:23	0B	25	04	5C	0E	0D	10	2E	
1329:01	9D	12	B7	4C	36	16	A9	06	1559:15	20	4D	F0	01	60	AD	85	39	1789:0E	00	1E	10	06	0A	1E	0D	25	
1331:20	91	FB	78	88	07	CC	09	57	1561:1E	38	E9	02	29	07	D0	03	10	1791:07	06	03	11	13	00	1A	13	16	
1339:99	A1	1E	20	FA	09	4C	14	03	1569:05	73	38	60	F9	4C	F2	08	EE	1799:0E	C2	B9	36	2E	8A	81	22	DA	
1341:17	C5	25	6A	09	B1	FB	AE	65	1571:AD	11	D0	10	FB	A2	01	EE	2D	17A1:18	2E	0A	2A	20	60	94	80	77	
1349:94	DD	43	1E	D4	A0	87	28	DB	1579:78	8E	8B	34	40	61	B9	8A	BD	17A9:AC	04	07	A2	84	89	62	A0	E9	
1351:01	60	20	80	09	68	ED	03	E4	1581:1E	AA	B9	8B	1E	A8	AD	C5	0A	17B1:0B	19	19	68	C6	E0	02	FC	10	
1359:E3	D0	32	AD	AE	00	49	C0	8F	1589:0B	20	AB	19	AE	89	94	29	36	17B9:80	B8	D8	18	0B	68	06	0A	03	
1361:05	0A	07	8D	68	AD	43	1A	E0	1591:C8	C8	E8	E0	04	D0	DF	4C	EC	17C1:34	B8	28	BE	E0	02	C0	80	3A	
1369:8D	64	A0	01	83	0A	07	A4	8A	1599:A1	17	0A	8D	97	43	8C	08	5F	17C9:0A	4C	06	C0	00	06	0B	64	6F	
1371:07	B9	70	DB	99	6F	DB	C8	60	15A1:8A	8A	68	0A	90	02	A0	01	30	17D1:A0	D0	03	04	19	12	04	04	42	
1379:C0	28	D0	EF	AD	86	C0	79	A5	15A9:8C	B2	04	74	00	D0	8A	4A	31	17D9:20	12	82	CF	00	DA	06	8C	AD	
1381:41	07	AD	88	1E	8D	97	DB																				


```

1829:1F 66 01 23 12 03 00 00 71
1831:80 17 00 08 15 0B 00 16 D2
1839:15 0A 00 23 15 05 FF C0 26
1841:F0 7F F0 F1 C0 FC F7 C0 B1
1849:BC 0B FE 88 80 80 B0 14 7E
1851:25 20 F9 00 7F E9 00 3F 3E
1859:89 00 3E 40 5C 18 40 10 ED
1861:32 04 00 48 09 00 30 09 E1
1869:FE 0A 3E 03 8F 40 BB EF 78
1871:3F 7F 26 01 20 02 85 0D 17
1879:08 00 9F 54 02 97 FE 00 53
1881:91 FC 2A 00 3B 90 D2 00 C0
1889:08 85 40 90 12 00 90 0C ED
1891:CB 52 08 14 20 C5 45 1C 3D
1899:0E 05 42 21 FF C3 FF 0F 8A
18A1:C3 F0 0F FF F0 50 71 81 FE
18A9:3F FF FC 4E A0 3C 18 C2 E6
18B1:18 94 05 10 80 23 05 19 68
18B9:81 55 98 04 90 8F 09 05 2D
18C1:02 01 09 96 13 76 E0 01 F2
18C9:0C 81 0E 14 1A 06 01 14 62
18D1:07 7B 18 06 05 B1 25 0A 0B
18D9:05 01 18 07 7D 1F 05 A1 54
18E1:0B 20 08 1A 28 EE 00 21 60
18E9:09 6C A0 06 39 22 0A 01 95
18F1:31 07 0D 19 04 13 06 00 28
18F9:0C D0 15 00 0F 10 01 BC 7E
1901:0C 11 01 12 C0 01 01 15 DF
1909:0F 03 3C 12 90 09 15 13 12
1911:5A 12 14 04 04 03 18 0F 23
1919:00 3E 12 01 00 18 13 04 B7
1921:00 1E 0F 04 01 1E 10 04 A1
1929:FF 00 6B 7F 3E 77 3E 7F 8C
1931:6B E0 82 2F 80 00 3C 3C 4D
1939:00 00 1C C8 08 FF FF A0 5C
1941:02 08 42 42 7E 7E 8E 1F 0D
1949:93 08 00 FD FB F7 02 04 EE
1951:08 02 05 07 01 02 03 03 32
1959:03 06 09 0C 0C 0C FA C8 BF
1961:96 64 32 50 52 45 53 53 E4
1969:20 42 55 54 A0 C2 0F 4E A8
1971:20 54 4F 20 50 4C 41 59 44
1979:10 4F C8 45 58 54 52 41 EE
1981:3A 00 12 20 92 4C 45 56 BB
1989:45 4C 3A 00 EA 00 00 00 10

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Maurice Yanney is the author of *Cats & Mice and Umbrellas*, games that appeared in *Gazette* earlier this year. He lives in Lebanon, Pennsylvania.

CD+

By Daniel Lightner

Character Designer (September 1992) is a utility program that lets you create your own characters and use them to set up animation sequences. With its sketch pad you can create a design, character, or picture that you can save as a sequential file.

CD+ is a special addition to Character Designer (CD) that lets you use the original program to design high-resolution bitmapped graphics. (Note: You will need a copy of Character Designer in or-

der to use CD+.)

CD+ is written in machine language. To enter it, use MLX, Gazette's machine language entry program, which you'll find elsewhere in this section. When MLX prompts for starting and ending addresses, supply the following values.

Starting address: 0801

Ending address: 1003

When you have finished entering the program, be sure to save a copy of it to a disk that contains the original Character Designer program. Character Designer must be named CD, because CD+ looks for that name and loads it while booting.

Using the Program

To use CD+, just load and run it as you would any BASIC program. CD+ then loads and activates Character Designer. The program begins on CD's work screen. Using CD's design and drawing features, you can create an image in the program's sketch window. When you have finished sketching, press the back arrow key to exit Sketch mode and then press the asterisk key (*). At this point, you'll see a menu new to Character Designer.

CD Bitmap Menu

Option 1 is Enter Bitmap Mode. Select this first option by pressing the 1 key. If the screen contains garbage, press Shift and Clr/Home simultaneously to clear it. Press Return whenever you wish to return to the Bitmap menu.

Your cursor will appear as four visible corners that define a section of the screen. You can move to a new section of the screen using your joystick or the cursor keys. If you wish to stamp the image from the sketch window into one of these 12 screen sections, move to the desired section and press either the fire button or the f7 key.

You may stamp the image into as many of the sections as you like. If you want to remove an image, press the Clr/Home key without using the Shift key.

Color

CD+ allows you to enter different colors in different areas of the screen. This color depends on the color used in the sketch window. If you need to col-

or a section of the screen but don't wish to stamp the graphic image there, just press the C key. That section of the screen will change to the background color of the sketch window, but it won't contain any graphics. You can equalize the color of the entire screen by pressing the E key.

By pressing the f1 key, you can transfer whatever image is under the markers to the sketch window. This is just the opposite of pressing f7. You can toggle the markers on and off by pressing the asterisk key. Remember, to exit Bitmap mode, just hit the Return key.

Loading and Saving

Option 2 lets you load a bitmap from disk. Doodle sketches will load into CD+ just fine.

Option 3 lets you save a screen to disk. This gives you a more powerful way to save character sets created using Character Designer. Just store them in the sketch window as you create them. When you wish to save them, stamp them on the bitmap and save the file. Later, you can load the bitmap and add more characters or take some or all from the bitmap and save them as sequential files using Character Designer's old Save option.

Disk Commands

Option 4 lets you enter a disk command. Be sure that you have the desired disk in the drive.

Disk commands should follow the same format that is used when opening the command channel to drive 8, except for the NEW disk command.

The COPYFILE command is CO: or C: followed by the new filename, an equal sign, and the old name. Here's an example.

CO:NEW FILE=ORIGINAL FILE

The RENAME FILE command works with a similar syntax.

RO:NEW NAME=OLD NAME

The SCRATCH command is SO: followed by the filename to be scratched. Wildcards are allowed. INITIALIZE is IO, and VALIDATE is VO.

The NEW command to format a disk works a little different from what you're

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used to. The syntax for this command is N0: followed by a disk name, but don't enter a unique ID at this point. Simply press Return. You will then be prompted for a two-character ID. Enter an ID and press Return again.

While in Disk Command mode, entering a dollar sign (\$) will give you the disk directory. You don't have to use quotation marks. To abort any of the above options, simply press the asterisk key and then press Return. The last option (5) will return you to Character Designer.

Doodle Converter

Although CD+ can load Doodle bitmaps, Doodle cannot load CD+ bitmaps. So I've included a short utility program that will convert CD+ bitmaps to Doodle.

CD Doodle is written in machine language, and it will have to be entered with MLX. When entering it, use the following addresses.

Starting address: 0801

Ending address: 0BAD

Be sure to save a copy of CD Doodle to disk before leaving MLX.

First create and save a bitmap from CD+. Then exit to BASIC and load and run CD Doodle. You will be prompted for the filename that you used to save the bitmap graphic. Enter that filename and press Return. Be sure that the disk containing the graphic is in the drive.

After the file loads, the program prompts you to place a disk in the drive onto which you want to save the converted image. Do this and press the spacebar when ready.

CD Doodle will save the file as DD plus the filename that you used. This file can now be used in Doodle.

CD+

```
0801:22 08 0A 00 9E 32 30 38 BB
0809:38 20 43 44 2B 20 31 39 5F
0811:39 33 3A 20 43 4F 4D 50 16
0819:55 54 45 20 20 20 20 75
0821:00 00 00 75 07 00 80 AD 6F
0829:24 08 8D B2 02 AD 25 08 43
0831:8D B3 02 AD 26 08 85 FD 6A
0839:AD 27 08 85 FE A9 8E 85 84
0841:FB A9 08 85 FC 18 A5 FB A2
0849:6D B2 02 8D B4 02 A5 FC CB
0851:6D B3 02 8D B5 02 A0 00 15
0859:B1 FB 91 FD 18 A5 FB 69 0C
```

```
0861:01 85 FB A5 FC 69 00 85 40
0869:FC 18 A5 FD 69 01 85 FD EA
0871:A5 FE 69 00 85 FE A5 FB B0
0879:CD B4 02 F0 03 4C 88 08 4F
0881:A5 FC CD B5 02 F0 03 4C DE
0889:59 08 6C 26 08 A9 02 8D B0
0891:34 03 A9 43 8D 35 03 A9 D6
0899:44 8D 36 03 20 02 84 A9 E1
08A1:00 A2 FF A0 FF 20 D5 FF 90
08A9:A9 28 8D 39 09 A9 80 8D 5B
08B1:3A 09 4C 28 08 20 E4 FF B7
08B9:C9 2A F0 03 4C 95 09 AD FF
08C1:51 21 0A 0A 0A 0A 8D 72 AA
08C9:87 AD 21 D0 29 0F 0D 72 4C
08D1:87 8D 72 87 AD 10 D0 8D AC
08D9:6F 87 AD 00 D0 8D 70 87 5E
08E1:AD 01 D0 8D 71 87 AD 18 19
08E9:D0 29 0F 09 A0 8D 18 D0 5B
08F1:A9 28 8D 88 02 A9 00 8D 5F
08F9:15 D0 A9 93 20 D2 FF A0 24
0901:00 B9 68 85 20 D2 FF C8 FB
0909:C0 6B D0 F5 20 E4 FF C9 2E
0911:31 F0 1B C9 32 F0 1A C9 4B
0919:33 F0 19 C9 34 F0 18 C9 20
0921:35 D0 E9 A9 01 8D 15 D0 13
0929:20 B0 80 4C DB 08 4C E0 C4
0931:80 4C 83 83 4C C1 83 20 CF
0939:C4 84 4C 59 80 AD 18 D0 A9
0941:29 F0 09 10 8D 18 D0 A9 E5
0949:04 8D 88 02 AD 6F 87 8D B9
0951:10 D0 AD 70 87 8D 00 D0 9F
0959:AD 71 87 8D 01 D0 60 A0 15
0961:D0 B9 D3 85 99 00 50 C8 EA
0969:C0 00 D0 F5 60 AD 27 D0 2E
0971:8D 28 D0 8D 29 D0 8D 2A 19
0979:D0 20 D2 80 A9 40 8D F8 C0
0981:47 A9 41 8D F9 47 A9 42 25
0989:8D FA 47 A9 43 8D FB 47 34
0991:AD 18 D0 29 F0 09 20 29 42
0999:0F 09 10 8D 18 D0 A9 44 EB
09A9:D0 88 02 20 9A 82 AD 18 31
09B1:8D 09 08 8D 18 D0 AD 11 B0
09B1:D0 09 20 8D 11 D0 A9 0F 79
09B9:8D 15 D0 AD 02 DD 09 03 69
09C1:8D 02 DD AD 00 DD 29 FC 78
09C9:09 02 8D 00 DD AE 6E 87 A0
09D1:E0 03 D0 03 4C 53 82 E0 F4
09D9:07 D0 03 4C 53 82 E0 0B 3A
09E1:D0 03 4C 53 82 A9 00 8D 24
09E9:10 D0 A2 00 AD CA 02 C9 F2
09F1:01 F0 F9 20 E4 FF 20 20 89
09F9:83 C9 00 F0 EF A2 01 8E E9
0A01:CA 02 C9 1D F0 76 C9 9D 98
0A09:F0 6F C9 88 F0 62 C9 93 6B
0A11:F0 61 C9 13 F0 57 C9 2A 03
0A19:F0 5C C9 43 F0 46 C9 45 A3
0A21:F0 45 C9 85 F0 3B C9 0D A5
0A29:D0 C2 A9 00 8D 15 D0 AD 9B
0A31:18 D0 29 F0 69 0C 09 04 4B
0A39:29 0F 09 10 8D 18 D0 A9 DF
0A41:04 8D 88 02 AD 11 D0 29 68
0A49:0F 8D 11 D0 AD 02 DD 09 1A
0A51:03 8D 02 DD AD 00 DD 29 BA
0A59:FC 09 03 8D 00 DD 4C 59 D0
0A61:80 4C 4F 83 4C 74 82 20 44
0A69:01 83 4C 5F 81 4C C4 82 A7
0A71:4C 5B 82 4C 23 82 4C EC 40
0A79:82 4C 0A 82 AD 6E 87 18 99
0A81:69 01 C9 0C F0 09 8D BE B9
0A89:87 20 9A 82 4C 40 81 A9 F4
```

```
0A91:00 8D 6E 87 4C FC 81 AD 56
0A99:6E 87 38 E9 01 30 09 8D D4
0AA1:6E 87 20 9A 82 4C 40 81 C3
0AA9:A9 0B 8D 6E 87 4C 15 82 08
0AB1:A9 00 85 FB A9 60 85 FC E1
0AB9:20 01 83 A0 00 A9 00 91 D0
0AC1:FB 18 A5 FB 69 01 85 FB A4
0AC9:A5 FC 69 00 85 FC A5 FB 84
0AD1:C9 41 F0 03 4C 30 82 A5 37
0AD9:FC C9 7F D0 E0 4C 40 81 16
0AE1:A9 0F 8D 10 D0 4C 5D 81 35
0AE9:20 6B 83 A0 00 B1 FD 91 B7
0AF1:FB C8 C0 50 D0 F7 20 B0 AA
0AF9:82 20 BE 82 E8 E0 08 D0 03
0B01:EA AE 6E 87 BD 3E 87 85 F9
0B09:FB BD 4A 87 85 FC A2 00 B3
0B11:A0 00 AD 72 87 91 FB C8 97
0B19:C0 0A D0 F6 20 64 1A E8 4B
0B21:E0 08 D0 EC 4C 40 81 AE A7
0B29:6E 87 BD 32 87 AA A0 00 5B
0B31:BD D2 86 99 00 D0 C8 E8 03
0B39:C0 08 D0 F4 60 18 A5 FB C5
0B41:69 40 85 FB A5 FC 69 01 81
0B49:85 FC 60 20 72 1A 4C 72 76
0B51:1A AE 6E 87 BD 56 87 85 42
0B59:FB BD 62 87 85 FC A2 00 07
0B61:A0 00 A9 00 91 FB C8 C0 CB
0B69:50 D0 F7 20 B0 82 20 BE 6B
0B71:82 E8 E0 08 D0 EA 4C 74 DE
0B79:82 AD 15 D0 D0 08 A9 0F F4
0B81:8D 15 D0 4C 40 81 A9 00 DD
0B89:8D 15 D0 4C 40 81 A9 00 E5
0B91:85 FD A9 44 85 FE A2 00 D0
0B99:A0 00 AD 72 87 91 FD C8 24
0BA1:C0 28 D0 F6 20 72 1A E8 93
0BA9:E0 19 D0 EC 60 8D 73 87 07
0BB1:AD 00 DC 29 10 C9 10 D0 65
0BB9:1A AD 00 DC 29 0F 8D 74 2B
0BC1:87 A9 0F 38 ED 74 87 C9 85
0BC9:04 F0 0B C9 08 F0 0A AD E1
0BD1:73 87 60 A9 88 60 A9 9D E0
0BD9:60 A9 1D 60 20 6B 83 A0 8A
0BE1:00 B1 FB 91 FD C8 C0 50 E1
0BE9:D0 F7 20 B0 82 20 BE 82 0A
0BF1:E8 E0 08 D0 EA 4C 40 81 4D
0BF9:AE 6E 87 BD 56 87 85 FB A7
0C01:BD 62 87 85 FC A9 80 85 EE
0C09:FD A9 32 85 FE A2 00 60 0C
0C11:A0 00 20 B0 80 A9 93 20 7A
0C19:D2 FF A9 00 8D 15 D0 B9 EB
0C21:42 85 20 D2 FF C8 C0 13 A4
0C29:D0 F5 20 15 84 AD 35 03 C4
0C31:C9 2A F0 12 20 02 84 A9 B3
0C39:00 A2 FF A0 FF 20 D5 FF 30
0C41:20 69 84 20 43 84 A9 93 69
0C49:20 D2 FF 4C 32 80 A0 00 BF
0C51:20 B0 80 A9 93 20 D2 FF 13
0C59:A9 00 8D 15 D0 B9 55 85 E6
0C61:20 D2 FF C8 C0 13 D0 F5 B4
0C69:20 15 84 AD 35 03 C9 2A B5
0C71:F0 1A 20 2A 84 20 02 84 5C
0C79:A9 00 85 FB A9 60 85 FC AD
0C81:A2 4E A0 7F A9 FB 20 D8 E0
0C89:FF 20 69 84 4C B9 83 AD 1D
0C91:34 03 A2 35 A0 03 20 BD 3B
0C99:FF A9 08 A2 08 A0 08 4C 66
0CA1:BA FF A0 00 8C 34 03 A9 10
0CA9:20 20 D2 FF A9 3E 20 D2 8D
0CB1:FF A0 00 20 E4 18 60 A0 DC
0CB9:00 A2 00 BD 3E 87 85 FD 6F
```

0CC1:BD 4A 87 85 FE B1 FD 9D EC
 0CC9:41 7F E8 E0 0C D0 EC 60 6B
 0CD1:A9 60 8D 97 82 A2 00 8E 2F
 0CD9:6E 87 BD 41 7F 8D 72 87 75
 0CE1:20 74 82 AE 6E 87 E8 E0 A6
 0CE9:0C D0 EC A9 4C 8D 97 82 BE
 0CF1:A9 00 8D 6E 87 60 20 CC 42
 0CF9:FF A5 BA 20 B4 FF A9 6F 3D
 0D01:85 B9 20 96 FF A9 0D 20 9A
 0D09:D2 FF A9 20 20 D2 FF 20 30
 0D11:D2 FF 20 A5 FF C9 0D D0 05
 0D19:F6 20 AB FF A0 00 A9 01 85
 0D21:8D CA 02 AD CA 02 C9 01 C2
 0D29:F0 F9 C8 C0 28 D0 EF 60 24
 0D31:A9 0F A2 08 A0 0F 20 BA F4
 0D39:FF AD 34 03 A2 35 A0 03 A3
 0D41:20 BD FF 20 C0 FF A9 0F 45
 0D49:20 C3 FF 20 69 84 4C CC 29
 0D51:FF A0 00 B9 32 85 20 D2 E9
 0D59:FF C8 C0 10 D0 F5 20 15 72
 0D61:84 AD 35 03 C9 24 F0 09 C9
 0D69:C9 4E F0 12 C9 2A D0 C0 94
 0D71:60 A9 01 8D 15 D0 20 B0 FB
 0D79:80 68 68 4C C9 1A A0 00 B7
 0D81:B9 25 85 20 D2 FF C8 C0 5D
 0D89:0D D0 F5 20 CF FF 48 20 4E
 0D91:CF FF 48 AC 34 03 A9 2C 94
 0D99:99 35 03 68 99 37 03 68 CC
 0DA1:99 36 03 EE 34 03 EE 34 25
 0DA9:03 EE 34 03 AD 35 03 4C 4C
 0DB1:DF 84 0D 0D 55 4E 49 51 17
 0DB9:55 45 20 49 44 3F 20 0D D4
 0DC1:0D 44 49 53 4B 20 43 4F 82
 0DC9:4D 4D 41 4E 44 20 3F 0D 19
 0DD1:0D 20 20 4C 4F 41 44 20 6B
 0DD9:46 49 4C 45 20 4E 41 4D 51
 0DE1:45 3F 0D 0D 20 20 53 41 4A
 0DE9:56 45 20 46 49 4C 45 20 0F
 0DF1:4E 41 4D 45 3F 11 11 20 02
 0DF9:2A 20 43 44 20 42 49 54 CE
 0E01:4D 41 50 20 4D 45 4E 55 91
 0E09:20 2A 0D 0D 31 2E 20 45 F9
 0E11:4E 54 45 52 20 42 49 54 28
 0E19:4D 41 50 20 4D 4F 44 45 AD
 0E21:0D 0D 32 2E 20 4C 4F 41 42
 0E29:44 20 42 49 54 4D 41 50 F6
 0E31:0D 0D 33 2E 20 53 41 56 87
 0E39:45 20 42 49 54 4D 41 50 87
 0E41:0D 0D 34 2E 20 44 49 53 88
 0E49:4B 20 43 4F 4D 4D 41 4E 00
 0E51:44 0D 0D 35 2E 20 45 58 9C
 0E59:49 54 20 54 4F 20 43 44 3E
 0E61:FF E0 00 C0 00 C0 00 C0 43
 0E69:00 C0 00 00 C0 00 C0 7C
 0E71:00 00 C0 00 00 C0 00 00 A8
 0E79:00 00 00 00 00 00 00 95
 0E81:00 00 00 00 00 00 00 9D
 0E89:00 00 00 00 00 00 00 A5
 0E91:00 00 00 00 00 00 00 AD
 0E99:00 00 00 00 00 00 00 B5
 0EA1:00 07 FF 00 00 03 00 00 8B
 0EA9:03 00 00 03 00 00 03 7D
 0EB1:00 03 00 00 03 00 00 03 A9
 0EB9:00 00 00 00 00 00 00 D5
 0EC1:00 00 00 00 00 00 00 DD
 0EC9:00 00 00 00 00 00 00 E5
 0ED1:00 00 00 00 00 00 00 ED
 0ED9:00 00 00 00 00 00 00 F5
 0EE1:00 00 00 00 00 00 00 FD
 0EE9:00 00 00 00 00 00 00 06

0EF1:00 00 00 00 00 00 00 0E
 0EF9:00 00 00 00 00 00 00 16
 0F01:00 00 00 00 00 00 00 DF
 0F09:30 00 C0 00 00 C0 00 00 42
 0F11:C0 00 00 C0 00 00 C0 00 1D
 0F19:00 C0 00 00 FF E0 00 00 EA
 0F21:00 00 00 00 00 00 00 3F
 0F29:00 00 00 00 00 00 00 47
 0F31:00 00 00 00 00 00 00 4F
 0F39:00 00 00 00 00 00 00 57
 0F41:00 00 00 00 00 00 00 5F
 0F49:00 03 00 00 03 00 00 03 43
 0F51:00 00 03 00 00 03 00 00 DB
 0F59:03 00 00 03 00 07 FF 18 5D
 0F61:32 50 32 18 5D 50 5D 66 C1
 0F69:32 A1 32 66 5D A1 5D B6 98
 0F71:32 F2 32 B6 5D F2 5D 07 8F
 0F79:32 41 32 07 5D 41 5D 18 7A
 0F81:72 50 72 18 9D 50 9D 66 8C
 0F89:72 A1 72 66 9D A1 9D B6 63
 0F91:72 F2 72 B6 9D F2 9D 07 5A
 0F99:72 41 72 07 9D 41 9D 18 45
 0FA1:B2 50 B2 18 DD 50 DD 66 57
 0FA9:B2 A1 B2 66 DD A1 DD B6 2E
 0FB1:B2 F2 B2 B6 DD F2 DD 07 25
 0FB9:B2 41 B2 07 DD 41 DD 00 F7
 0FC1:08 10 18 20 28 30 38 40 9F
 0FC9:48 50 58 00 0A 14 1E 40 48
 0FD1:4A 54 5E 80 8A 94 9E 44 26
 0FD9:44 44 44 45 45 45 45 46 18
 0FE1:46 46 46 00 50 A0 F0 00 64
 0FE9:50 A0 F0 00 50 A0 F0 00 BD
 0FF1:60 60 60 6A 6A 6A 74 51
 0FF9:74 74 74 00 00 00 00 FD
 1001:00 00 00 00 00 00 00 21

CD DOODLE

0801:1E 08 0A 00 9E 32 30 38 B9
 0809:38 20 00 00 00 00 00 3D
 0811:00 00 00 00 00 00 00 21
 0819:00 00 00 00 00 00 00 29
 0821:00 00 00 00 00 00 20 51
 0829:CC FF A0 00 A9 00 8D 20 3C
 0831:D0 8D 21 D0 A9 93 20 D2 EC
 0839:FF A9 9A 20 D2 FF 20 68 48
 0841:0A 20 15 0A A0 00 B9 55 6F
 0849:0B 20 D2 FF C8 C0 10 D0 7B
 0851:F5 20 23 0A 20 E4 FF 20 1E
 0859:B1 09 AD 3E 03 C9 24 F0 96
 0861:07 C9 2A D0 09 4C E2 FC F5
 0869:20 76 0A 4C 28 08 AC 3A 22
 0871:03 A2 00 BD 65 0B 99 3E 50
 0879:03 EE 3A 03 C8 E8 E0 05 EE
 0881:D0 F1 20 36 0A CE 3A 03 E0
 0889:AD 3A 03 A2 3E A0 03 20 24
 0891:BD FF A9 02 A2 08 A0 02 4E
 0899:20 BA FF 20 C0 FF 20 7B 2C
 08A1:09 C9 0D F0 40 A2 02 20 0A
 08A9:C6 FF A9 00 85 FD A9 60 2A
 08B1:85 FE 20 E4 FF 20 E4 FF E0
 08B9:A0 00 20 E4 FF 91 FD 18 C6
 08C1:A5 FD 69 01 85 FD A5 FE CF
 08C9:69 00 85 FE A5 FD C9 40 28
 08D1:F0 0A 20 B7 FF C9 40 F0 F4
 08D9:19 4C BB 08 A5 FE C9 7F BD
 08E1:F0 10 4C D3 08 A2 00 20 20
 08E9:C6 FF A9 02 20 C3 FF 4C 0F
 08F1:42 08 A2 00 20 C6 FF A9 3F
 08F9:02 20 C3 FF 20 15 0A A0 95
 0901:00 B9 87 0B 20 D2 FF C8 38

0909:C0 26 D0 F5 20 15 0A A5 8D
 0911:CB C9 40 F0 FA EE 3A 03 9D
 0919:EE 3A 03 AC 3A 03 A9 57 E4
 0921:99 3B 03 A9 44 8D 3C 03 9D
 0929:8D 3D 03 AD 3A 03 A2 3C EB
 0931:A0 03 20 BD FF A9 02 A2 81
 0939:08 A0 02 20 BA FF A9 00 E2
 0941:85 FB A9 5C 85 FC A2 FF 75
 0949:A0 7F A9 FB 20 D8 FF 20 05
 0951:15 0A 20 7B 09 C9 0D 20 D5
 0959:15 0A A0 00 B9 71 0B 20 56
 0961:D2 FF C8 C0 16 D0 F5 20 02
 0969:E4 FF A5 CB C9 19 F0 07 FA
 0971:C9 27 D0 F3 4C E2 FC 4C BF
 0979:28 08 A5 BA 20 B4 FF A9 7F
 0981:6F 85 B9 20 96 FF A9 0D FA
 0989:A0 00 20 D2 FF 99 E4 02 4F
 0991:C8 20 A5 FF C9 0D D0 F2 DB
 0999:20 D2 FF 20 AB FF AD E5 11
 09A1:02 C9 30 D0 08 AD E6 02 01
 09A9:C9 30 D0 01 60 A9 0D 60 FA
 09B1:A0 00 A9 00 8D 3A 03 20 C4
 09B9:E4 FF C9 00 F0 F9 C9 14 8E
 09C1:F0 39 C9 0D F0 20 C9 7B BB
 09C9:B0 ED C9 20 90 E9 C9 22 CC
 09D1:F0 E5 C9 2C F0 E1 AC 3A 74
 09D9:03 C0 14 F0 DA 20 D2 FF 2C
 09E1:20 F2 09 4C B8 09 AC 3A 24
 09E9:03 C0 00 F0 CA 20 D2 FF 39
 09F1:60 AC 3A 03 99 3E 03 EE 91
 09F9:3A 03 60 AC 3A 03 C0 01 21
 0A01:B0 03 4C B8 09 20 D2 FF B1
 0A09:38 AD 3A 03 E9 01 8D 3A C4
 0A11:03 4C B8 09 A9 0D 20 D2 F5
 0A19:FF 20 D2 FF A9 96 20 D2 4A
 0A21:FF 60 A9 0D 20 D2 FF 20 BF
 0A29:D2 FF A9 9A 20 D2 FF A9 7B
 0A31:FE 20 D2 FF 60 A9 00 85 F5
 0A39:FB A9 5C 85 FC A0 00 A9 AD
 0A41:B1 91 FE 18 A5 FB 69 01 84
 0A49:85 FB A5 FC 69 00 85 FC F6
 0A51:A5 FB C9 F8 D0 E9 A5 FC 76
 0A59:C9 5F D0 E3 B9 69 0B 91 9D
 0A61:FB C8 C0 08 D0 F6 60 A0 02
 0A69:00 B9 0A 0B 20 D2 FF C8 F2
 0A71:C0 4B D0 F5 60 A0 00 A9 61
 0A79:00 8D 20 D0 8D 21 D0 A9 3E
 0A81:93 20 D2 FF A9 01 A2 09 61
 0A89:A0 0B 20 BD FF A9 02 A2 DD
 0A91:08 A0 00 20 BA FF 20 C0 AA
 0A99:FF A2 02 20 C6 FF A9 9A BC
 0AA1:20 D2 FF A0 00 20 E4 FF CE
 0AA9:20 E4 FF 4C B5 0A A5 CB B8
 0AB1:C9 40 D0 28 20 E4 FF 8D 79
 0AB9:B0 02 20 E4 FF 0D B0 02 90
 0AC1:F0 35 20 E4 FF AA 20 E4 BD
 0AC9:FF 20 CD BD A9 20 D2 5C
 0AD1:FF 20 E4 FF F0 19 20 D2 89
 0AD9:FF 4C D2 0A A5 CB C9 1B 07
 0AE1:F0 04 C9 40 D0 F6 A5 CB 26
 0AE9:C9 40 F0 FA 4C B5 0A A9 B7
 0AF1:00 20 D2 FF 4C AF 0A A9 CD
 0AF9:00 20 C6 FF A9 02 20 C3 48
 0B01:FF A5 CB C9 01 D0 FA 60 38
 0B09:24 0D 43 44 2D 44 4F 4F 89
 0B11:44 4C 45 0D 43 4F 50 59 27
 0B19:52 49 47 48 54 20 31 39 D6
 0B21:39 32 20 43 4F 4D 50 55 3E
 0B29:54 45 0D 50 55 42 4C 49 F6
 0B31:43 41 54 49 4F 4E 53 20 D2

```

0B39:49 4E 54 4C 20 4C 54 44 F5
0B41:0D 41 4C 4C 20 52 49 47 A0
0B49:48 54 53 20 52 45 53 45 98
0B51:52 56 45 44 43 44 20 42 C0
0B59:49 54 2D 4D 41 50 20 46 75
0B61:49 4C 45 3F 2C 50 2C 52 19
0B69:4E 63 65 66 51 59 5A 5B 92
0B71:44 4F 20 41 4E 4F 54 48 36
0B79:45 52 20 44 4F 4F 44 4C 9B
0B81:45 3F 20 59 2F 4E 50 4C 43
0B89:41 43 45 20 44 4F 4F 44 FD
0B91:4C 45 20 44 49 53 4B 20 B5
0B99:49 4E 20 44 52 49 56 45 D9
0BA1:20 48 49 54 20 41 4E 59 44
0BA9:20 4B 45 59 00 00 00 00 E0
    
```

Daniel Lightner, the author of *Risers and Sliders*, lives in Sidney, Montana.

SILICON COBBLER

By Bob Markland

Convenience! Webster defines *convenience* as "anything that saves work." Busy people of the nineties demand convenience. Recognizing this, many commercial programs load and run with the fewest possible keystrokes from the user. Unfortunately, this convenience isn't available on many disks and most shorter programs.

Silicon Cobbler is an autoboot maker that provides a simple solution to this and requires no computer or programming experience. Although there have been a number of autoboot makers written, many attach themselves to a program and permanently alter it. Some work only with BASIC programs; others work only with machine language routines.

Silicon Cobbler works with virtually any program and allows maximum flexibility. Most important, it creates a one-block autoboot program that is totally independent of the original program.

With an autoboot as the first file on the disk followed by a menu/loader, you have a combination that creates effortless program selection and loading.

Typing It In

Silicon Cobbler is written entirely in BASIC. To help avoid errors, enter it with The Automatic Proofreader, which you will find elsewhere in this section. Before exiting Proofreader, be sure to save a copy of the program to disk.

Creating an Autoboot

To use Silicon Cobbler, load and run it as you would any BASIC program. It

takes only a few minutes to create an autoboot. Silicon Cobbler walks you through, letting you select the border, screen, and character colors during the initial loading. These attributes enable you to select the visual effects you want for a smooth transition while your main program loads.

You are then prompted for the name of the program to be loaded and run. Enter the filename of the program for which you are creating the autoboot. You may type the first few letters followed by an asterisk (*) wildcard, as long as no filename conflicts result.

You are then asked for the command to activate the program. Type in the command that you normally use to activate the main program. This is usually RUN or SYS and a starting address. The next prompt asks for a character color following the load. In most cases, set this attribute to match the screen and border color in steps 1 and 2. This provides for a smooth transition. You are then asked for a filename for the autoboot program. For easy identification, give the autoboot a name similar to the name of the program it boots. For example, you might add the suffix LOAD or BOOT to the filename. Silicon Cobbler then lists the choices that you have made. Carefully check each attribute. If you find an error, press S to start over; otherwise, press C to Continue.

When you continue, the autoboot will be created. Be sure the destination disk is in the drive. There are two techniques for utilizing autoboots. If the autoboot is the first directory entry, the program may be booted by typing LOAD"*/8,1. For programs elsewhere in the directory, load the autoboot program with the .8,1 extension.

The final prompt gives you the option to make additional autoboots or quit to BASIC.

Troubleshooting

If a BASIC program will not autoboot, check the program's load address. If it's not 2049, change it.

Silicon Cobbler checks for disk drive errors. If a filename already exists on your disk, select another name, or overwrite the existing autoboot. If you find that an autoboot does not work properly, create a new autoboot and

overwrite the old one.

Advanced Techniques

Autoboots can be successfully added to nearly all disks, including backups of commercial software. If the program uses a standard directory, save the autoboot as you normally would, and then move its filename to the first directory position.

In cases where there is only one file listed and no bytes free, there may still be a solution. With a sector editor, carefully check track 18's directory sectors. They may be standard even if the other tracks and sectors are not. If this is the case, create an autoboot on another disk and copy it to an unused sector on track 18. Use your sector editor to move the existing filenames in order to open the first position.

Finally, write the first directory entry for the autoboot and set its pointers to the sector on track 18 containing the autoboot. What with the possibility of a crash, never attempt this on the original commercial disk!

SILICON COBBLER

```

JS 10 REM: COPYRIGHT 1993 - CO
      MPUTE PUBLICATIONS INTL
      {SPACE}LTD - ALL RIGHTS
      {SPACE}RESERVED
FF 20 :
JP 50 PRINT"{CLR}"CHR$(142)CHR
$(8):POKE53280,2:POKE532
81,7:DIMC$(15):POKE788,5
2
CM 60 FORR=0TO15:READJUS:NEXT:
FORR=1TO125:READDT:CK=CK
+DT:NEXT
HB 70 IFCK<>15188THENPRINT"
{HOME}{BLK}{10 DOWN}
{8 SPACES}ERROR IN NUMER
ICAL DATA":STOP
HB 80 ML$="":RESTORE:FORR=0TO1
5:READC$(R):NEXT
GE 90 BL$="":FORR=1TO39:BL$=BL
$+" ":NEXT
SP 100 PRINT"{CLR}"{BLK}"TAB(12
)"{DOWN}SILICON COBBLER
":PRINTTAB(11)"PROGRAM
{SPACE}BOOT MAKER"
SB 110 PRINTTAB(12)"{DOWN}BY R
. MARKLAND"
PX 120 PRINTTAB(16)"(C) 1993":
PRINTTAB(5)"COMPUTE PUB
LICATIONS INTL LTD"
FA 130 FORR=1TO24:READDT:ML$=M
L$+CHR$(DT):NEXT
BD 140 GOSUB830:PRINT"
{4 SPACES}SELECT BORDER
COLOR DURING LOAD":PRI
    
```

```

NTTAB(16)"(0-15){DOWN}"
PK 150 TB=18:NT=0:LE=2:GOSUB85
0:BC=VAL(TP$):IFBC>15TH
EN140
EX 160 ML$=ML$+CHR$(BC):GOSUB8
20
HQ 170 FORR=1TO4:READDT:ML$=ML
$+CHR$(DT):NEXT
CE 180 GOSUB830:PRINT"
{4 SPACES}SELECT SCREEN
COLOR DURING LOAD":PRI
NTTAB(16)"(0-15){DOWN}"
FP 190 TB=18:NT=0:LE=2:GOSUB85
0:SC=VAL(TP$):IFSC>15TH
EN180
HP 200 ML$=ML$+CHR$(SC):GOSUB8
20
JS 210 FORR=1TO4:READDT:ML$=ML
$+CHR$(DT):NEXT
KJ 220 GOSUB830:PRINT"
{3 SPACES}SELECT CHARAC
TER COLOR DURING LOAD":
PRINTTAB(16)"(0-15)
{DOWN}"
XK 230 TB=18:NT=0:LE=2:GOSUB85
0:CL=VAL(TP$):IFCL>15TH
EN220
FX 240 ML$=ML$+CHR$(CL):GOSUB8
20
GP 250 FORR=1TO33:READDT:ML$=M
L$+CHR$(DT):NEXT
CD 260 GOSUB830:PRINTTAB(9)"EN
TER NAME OF PROGRAM"
{17 SPACES}
BF 270 PRINTTAB(11)"TO BE LOAD
ED/RUN":PRINTTAB(11)"(
1-16 CHARACTERS){DOWN}"
HE 280 TB=12:NT=1:LE=16:GOSUB8
50:NA$=TP$:ML$=ML$+CHR$
(LEN(NA$)):GOSUB820
QK 290 FORR=1TO31:READDT:ML$=M
L$+CHR$(DT):NEXT
FE 300 GOSUB830:PRINTTAB(8)"EN
TER NECESSARY COMMAND"
MF 310 PRINTTAB(10)"TO ACTIVAT
E PROGRAM":PRINTTAB(11)
"YOU WISH TO BOOT:"
BK 320 PRINTTAB(8)"(E.G. RUN O
R SYS49152){DOWN}"
EP 330 TB=12:NT=1:LE=8:GOSUB85
0:CM$=TP$:ML$=ML$+CHR$(
LEN(CM$)):GOSUB820
AK 340 FORR=1TO10:READDT:ML$=M
L$+CHR$(DT):NEXT
PH 350 ML$=ML$+CHR$(LEN(CM$)+1
):FORR=1TO11:READDT:ML$
=ML$+CHR$(DT):NEXT
JR 360 GOSUB830:PRINT" SELECT
{SPACE}CHARACTER COLOR
{SPACE}FOLLOWING LOAD"
DR 370 PRINTTAB(16)"(0-15)
{DOWN}"
PQ 380 TB=18:NT=0:LE=2:GOSUB85
0:CP=VAL(TP$):IFCP>15TH
EN360
MH 390 GOSUB820:ML$=ML$+CHR$(C
P):FORR=1TO8:READDT:ML$
=ML$+CHR$(DT):NEXT
ES 400 ML$=ML$+"LOADING, PLEAS
E WAIT..." +CHR$(0)
CX 410 FORR=1TOLEN(NA$):ML$=ML
$+MID$(NA$,R,1):NEXT:IF
LEN(NA$)=16THEN430
XC 420 FORR=LEN(NA$)+1TO16:ML$
=ML$+CHR$(234):NEXT
PB 430 FORR=1TOLEN(CM$):ML$=ML
$+MID$(CM$,R,1):NEXT:ML
$=ML$+CHR$(13)
XA 440 GOSUB830:PRINTTAB(11)"E
NTER A FILE NAME"
KS 450 PRINTTAB(11)"FOR THIS A
UTOBOOT":PRINTTAB(11)"
(1-16 CHARACTERS){DOWN}
"
HD 460 TB=12:NT=1:LE=16:GOSUB8
50:LN$=TP$:GOSUB820
PC 470 GOSUB830:PRINTTAB(2)"BO
RDER COLOR IS:"TAB(38-L
EN(C$(BC)))C$(BC)
HP 480 PRINTTAB(2)"SCREEN COLO
R IS:"TAB(38-LEN(C$(SC
)))C$(SC)
GX 490 PRINTTAB(2)"LOAD CHR CO
LOR IS:"TAB(38-LEN(C$(C
L)))C$(CL)
FX 500 PRINTTAB(2)"PROGRAM TO
{SPACE}BOOT IS:"TAB(38-
LEN(NA$))NA$
GE 510 PRINTTAB(2)"CMD TO ACTI
VATE IS:"TAB(38-LEN(CM$
))CM$
QF 520 PRINTTAB(2)"PROG CHR CO
LOR IS:"TAB(38-LEN(C$(C
P)))C$(CP)
ES 530 PRINTTAB(2)"AUTOBOOT NA
ME IS:"TAB(38-LEN(LN$))
LN$
PP 540 PRINTTAB(7)"{2 DOWN}PLE
ASE REVIEW YOUR CHOICES
":PRINTTAB(15)"{DOWN}TH
EN PRESS"
CH 550 PRINT"{DOWN}(C) TO CON
TINUE -/- (S) TO START
{SPACE}OVER"
CB 560 GETD$:IFD$=""THEN560
HR 570 IFD$="S"THEN80
EE 580 IFD$<"C"THEN560
EQ 590 GOSUB830:PRINTTAB(8)"IN
SERT DESTINATION DISK":
PRINTTAB(15)"{DOWN}THEN
PRESS"
JQ 600 PRINTTAB(7)"{DOWN}ANY K
EY TO CREATE AUTOBOOT":
POKE198,0
CG 610 GETD$:IFD$=""THEN610
AF 620 GOSUB830:PRINTTAB(8)"
{4 DOWN}WORKING, PLEASE
WAIT..."
DS 630 OPEN15,8,15,"I0":OPEN8
,8,8,"0:"+LN$+"P,R":CL
OSE8:FL=0:GOSUB960
PS 640 IFFLTHEN470
CE 650 OPEN15,8,15:OPEN8,8,8,"
0:"+LN$+"P,W":CLOSE8:F
L=0:GOSUB960
CB 660 IFFLTHEN470
DX 670 IFEL<>63THEN740
DK 680 GOSUB830:MS$="FILE "+CH
R$(34)+LN$+CHR$(34)+" A
LREADY EXISTS"
RC 690 PRINTTAB((40-(LEN(MS$)
)/2)MS$)
GJ 700 PRINTTAB(13)"{DOWN}OVER
WRITE IT?:PRINTTAB(16)
"Y -/- N"
JR 710 GETD$:IFD$=""THEN710
PK 720 IFD$="N"THEN440
RK 730 IFD$<"Y"THEN710
RE 740 OPEN15,8,15,"I0":PRINT
#15,"S0:"+LN$:CLOSE15
SJ 750 OPEN8,8,8,"O:"+LN$+"P,
W":PRINT#8,ML$:CLOSE8:C
LOSE15
PX 760 GOSUB830:PRINT"{2 DOWN}
{2 SPACES}AUTOBOOT COMP
LETED, DO YOU WISH TO:"
DF 770 PRINTTAB(10)"{DOWN}1.
{2 SPACES}CREATE ANOTHE
R?:PRINTTAB(10)"{DOWN}
2.{2 SPACES}QUIT?"
PQ 780 GETD$:IFD$=""THEN780
KF 790 IFD$="1"THEN80
MS 800 IFD$<"2"THEN780
XD 810 PRINT"{CLR}":POKE646,14
:POKE647,14:POKE53280,1
4:POKE53281,6:POKE788,4
9:END
BE 820 PRINT:PRINTTAB(16)"
{DOWN}ENTERED":FORT=1TO
1000:NEXT
MF 830 PRINT"{HOME}{9 DOWN}":F
ORR=1TO14:PRINTBL$:NEXT
:PRINT"{HOME}{9 DOWN}"
CM 840 RETURN
GM 850 POKE198,0:PRINTTAB(TB);
:POKE204,0:TP$=""
GS 860 POKE647,PEEK(646):GETKI
$:IFKI$=""THEN860
KM 870 IFKI$=CHR$(34)THEN860
JF 880 IFKI$=CHR$(13)ANDLEN(TP
$)>0THENPRINT" ";:POKE2
04,1:RETURN
FR 890 IFKI$=CHR$(20)ANDLEN(TP
$)>0THEENTP$=LEFT$(TP$,L
EN(TP$)-1):GOTO950
KR 900 IFKI$=>CHR$(48)ANDKI$=<
CHR$(57)THEN930
DB 910 IFNTHENIFKI$=>CHR$(32)
ANDKI$=<CHR$(90)THEN930
CA 920 GOTO860
PG 930 IFLEN(TP$)=(LE)THEN860
SD 940 TP$=TP$+KI$
HK 950 PRINTKI$;:GOTO860
GQ 960 INPUT#15,E1,ER$,E2,E3
GF 970 IFEL=0OREL=62OREL=63THE
NCLOSE15:RETURN
XF 980 CLOSE15:FL=1
HC 990 GOSUB830:PRINTTAB(9)"*
{SPACE}* * DISK ERROR *
* * "
KK 1000 PRINTTAB(10)"{DOWN}";E

```

PROGRAMS/ THE AUTOMATIC PROOFREADER

```

1;ER$;E2;E3
BR 1010 PRINTTAB(3){DOWN}CHEC
      K DISK & DRIVE, THEN T
      RY AGAIN"
MB 1020 PRINTTAB(7){DOWN}PRES
      S ANY KEY TO CONTINUE"
EX 1030 GETD$:IFD$=""THEN1030
DA 1040 RETURN
PH 1050 DATA BLACK,WHITE,RED,C
      YAN,PURPLE,GREEN,BLUE,
      YELLOW,ORANGE,BROWN,LI
      GHT RED
KH 1060 DATA DARK GRAY,MEDIUM
      {SPACE}GRAY,LIGHT GREE
      N,LIGHT BLUE,LIGHT GRA
      Y
RF 1070 DATA 44,3,60,3,102,254
      ,165,244,237,245,0,0,0
      ,0,0,0,0
RF 1080 DATA 169,147,32,210,25
      5,169
QR 1090 DATA 141,32,208,169
RR 1100 DATA 141,33,208,169
BX 1110 DATA 141,134,2,32,138,
      255,32,231,255,160,0,2
      4,162,12,160,8,32,240,
      255
GQ 1120 DATA 160,0,185,174,3,2
      40,6,32,210,255,200,20
      8,245,169
KB 1130 DATA 162,199,160,3,32,
      189,255,169,1,168,162,
      8,32,186,255,173,33,20
      8
PE 1140 DATA 141,134,2,169,0,3
      2,213,255,134,45,132,4
      6,160
MR 1150 DATA 185,215,3,153,119
      ,2,136,16,247,169
HP 1160 DATA 133,198,32,94,166
      ,169,147,32,210,255,16
      9
AJ 1170 DATA 141,134,2,162,128
      ,108,2,3
  
```

Bob Markland is the author of *Electronic Billboard*, a bonus program on the *March Gazette Disk*. He lives in *Newcastle, Wyoming*.

TELEWORD 128

Donald G. Klich

Have you ever watched a television commercial and been asked to call a telephone number that's in the form of a catchy phrase for the advertiser's product? A financial lender might want you to dial CASH NOW for a quick loan, or perhaps an automobile dealer might tell you to call 1-800 CAR DEAL for a great deal in a used car.

Except for numbers 1 and 0, each number on a standard U.S. telephone con-

tains a group of three letters. All the letters of the alphabet except Q and Z are represented. So, to dial CASH NOW, you'd press the numbers that correspond to those letters on the dial. In this example, those numbers would be 2274669.

Have you ever wondered if the letters associated with your telephone number might spell something clever? Rather than trying to go through all of the combinations mentally, *Teleword 128* is the program you need.

Entering the Program

Teleword 128 is written entirely in BASIC 7.0 for the 128. To help avoid typing errors, enter it with *The Automatic Proofreader*, which can be found elsewhere in this section. Be sure to save a copy of the program before you try to run it.

Number, Please

All you have to do is run *Teleword 128* and enter a seven-digit number. The program will print out or display on-screen every combination of letters possible for that number. In case you are wondering, the maximum number of possibilities is 2178. (That's 3 to the seventh power.) That many combinations will fill four printed pages or 20 screens.

If you have any 0s or 1s in your telephone number, you'll end up with fewer combinations since there are no corresponding letters for these numbers.

You may be surprised at how few good word combinations turn up. I'm convinced that the stores first devise a clever word/number and then attempt to get that number from the telephone company. That's particularly easy to do with 800 numbers.

Just in case you're wondering, if you have telephone number 266-7883, that's the one that spells *COMPUTE*. Of course, it also spells *BOOSTUF*, whatever that means!

TELEWORD 128

```

MS 10 REM COPYRIGHT 1993 - COM
      PUTE PUBLICATIONS INTL L
      TD - ALL RIGHTS RESERVED
XD 20 DIMA$(10,3):FORI=0TO9:FO
      RJ=1TO3:READB$:A$(I,J)=B
      $:NEXTJ,I:COLOR0,1:COLOR
      1,11:COLOR4,1:GRAPHIC2,1
      ,7:L=2:R=0:LS=2:RS=0
SR 30 CHAR1,7,4,"TELEPHONE NUM
  
```

```

BER CONVERTER":COLOR1,2:
CIRCLE1,160,35,120,15
HD 40 INPUT"{WHT}OUTPUT TO THE
      {RED}P{WHT}RINTER OR
      {RED}T{WHT}UBE P/T";QS:I
      FQS="T"THENSW=0:GOTO70
FA 50 IFQS="P"THENSW=1:OPEN1,4
      :ELSERUN
JE 60 PRINT"{3 DOWN}{CYN}BE SU
      RE THAT YOUR PRINTER IS
      {SPACE}SET TO THE":PRINT
      SPC(10)"TOP OF A PAGE...
      {6}"
DP 70 PRINT"{3 DOWN}{2 SPACES}
      WHAT IS THE TELEPHONE NU
      MBER{2 SPACES}NNNNNNN";:
      SLEEP1:INPUT"{9 LEFT}";B
      $:IFLEN(B$)>7ORLEN(B$)<7
      THENPRINT"{4 DOWN}SEVEN
      {SPACE}DIGITS PLEASE":SL
      EEP1:RUN
XM 80 FORI=1TO7:C$=MID$(B$,I,1
      ):IFVAL(C$)<2THENN(I)=1:
      ELSEN(I)=3
JM 90 NEXTI
XF 100 IFSWTHENGOSUB160:GOTO11
      0:ELSEGOSUB200
SD 110 FORA=1TON(1):FORB=1TON(
      2):FORC=1TON(3):FORD=1T
      ON(4):FORE=1TON(5):FORF
      =1TON(6):FORG=1TON(7):T
      $=A$(VAL(MID$(B$,1,1)),
      A)+A$(VAL(MID$(B$,2,1)
      ),B)
HC 120 T$=T$+A$(VAL(MID$(B$,3,
      1)),C)+A$(VAL(MID$(B$,4
      ,1)),D)+A$(VAL(MID$(B$,
      5,1)),E)+A$(VAL(MID$(B$,
      6,1)),F)+A$(VAL(MID$(B
      $,7,1)),G)
DS 130 IFSWTHENGOSUB170:GOTO14
      0:ELSEGOSUB210
EP 140 NEXTG,F,E,D,C,B,A:IFSWG
      OTOL90:ELSE250
HE 150 DATA0,0,0,1,1,1,A,B,C,D
      ,E,F,G,H,I,J,K,L,M,N,O,
      P,R,S,T,U,V,W,X,Y
BK 160 PRINT#1,"PRINTOUT FOR T
      ELEPHONE NUMBER ";LEFT$(
      B$,3);"-";RIGHT$(B$,4)
      :PRINT#1:RETURN
HM 170 PRINT#1,T$;" ";:T=T+1:R
      =R+1:IFR=10THENR=0:PRIN
      T#1:L=L+1
JH 180 IFL=60THENFORL=1TO6:PRI
      NT#1:NEXTL:L=0:RETURN:EL
      SERETURN
DJ 190 PRINT#1:PRINT#1,"THERE
      {SPACE}WERE "T" COMBINA
      TIONS":CLOSE1:END
XR 200 GRAPHIC0,1:PRINT"DISPLA
      Y OF TELEPHONE NUMBER "
      ;LEFT$(B$,3);"-";RIGHT$(
      B$,4):PRINT:RETURN
QG 210 PRINTT$;" ";:T=T+1:RS=R
      S+1:IFRS=5THENRS=0:PRIN
      T:LS=LS+1
  
```

```

KE 220 IFLS<>23THENRETURN:ELSE
LS=2:PRINT"PRESS SPACE
{SPACE}TO CONTINUE"
FD 230 GETKEYQS:IFQS<>" "THEN2
30
MM 240 GOSUB200:RETURN
QB 250 PRINT:PRINT"THERE WERE
{SPACE}"T" COMBINATIONS
":END

```

Donald Klich lives in Mount Prospect, Illinois. He didn't say anything about his own telephone number. □

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, Gazette Disk offers bonus programs. Here's a special program that you'll find only on this month's disk.

Football

By Jack Rollan
New York, NY

Summer is drawing to a close, leaves are beginning to change color, and back-to-school sales are popping up at the mall. These signs can mean just one thing: FOOTBALL!

Jack Rollan's Football is a real-time, solitaire football simulation that allows users to design their own plays and then attempt to execute them on the field. You'll control the players in the yellow and white uniforms (the home team) with your joystick in port 2.

Load Football with the ,8,1 extension, and then type `SYS 49152` to start. This is a large game, and it takes several minutes to load. If you have an accelerator cartridge, it'll come in handy here.

With your joystick, you design plays to run, pass, punt, or attempt field goals. After the center hikes the ball, the screen changes to graphics mode. At this point, you control the quarterback on offense or the free safety on defense.

You can have this program, our PD selections, and all the other programs in this issue by ordering the September Gazette Disk. The U.S. price is \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

Next, type `RUN` and press Return. After the program displays the message *Proofreader Active*, you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line. Also, be sure not to skip any lines.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using Proofreader on the 128, do not perform any GRAPHIC commands while Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while Proofreader is in memory.

Though Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to `SYS` to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

AUTOMATIC PROOFREADER

```

0 CLR
10 VE=PEEK(772)+256*PEEK(773):
LO=43:HI=44:PRINT"{CLR}
{WHT}AUTOMATIC PROOFREADER
{SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
6:FOR J=SA TO SA+166:READ B
:POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
RROR* CHECK TYPING IN DATA
{SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
RS=SA+RF:HB=INT(RS/256):LB=
RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
RROR* RELOAD PROGRAM AND CH
ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
,22:POKE SA+18,23:POKESA+29
,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
SA+150,PEEK(773):PRINT"
{CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
POKE (PEEK(LO)+256*PEEK(HI
))-1,0:NEW
120 DATA120,169,73,141,4,3,169
,3,141,5,3,88,96,165,20,13
3,167
130 DATA165,21,133,168,169,0,1
41,0,255,162,31,181,199,15
7,227
140 DATA3,202,16,248,169,19,32
,210,255,169,18,32,210,255
,160
150 DATA0,132,180,132,176,136,
230,180,200,185,0,2,240,46
,201
160 DATA34,208,8,72,165,176,73
,255,133,176,104,72,201,32
,208
170 DATA7,165,176,208,3,104,20
8,226,104,166,180,24,165,1
67
180 DATA121,0,2,133,167,165,16
8,105,0,133,168,202,208,23
9,240
190 DATA202,165,167,69,168,72,
41,15,168,185,211,3,32,210
,255
200 DATA104,74,74,74,74,168,18
5,211,3,32,210,255,162,31,
189
210 DATA227,3,149,199,202,16,2
48,169,146,32,210,255,76,8
6,137
220 DATA65,66,67,68,69,70,71,7
2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
116,117,151,128,129,167,13
6,137

```

Machine Language Entry Program

MLX for Commodore 64

Ottis R. Cowper

Type in and save some copies of MLX—you'll want to use it to enter future ML programs from Gazette. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But even if you know nothing about ML or hex, you should have no trouble using MLX.

After you've entered the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option. A functions menu will appear. The first option in the menu is Enter Data. If you're just starting to type in a program, pick this. Press the E key and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you stopped typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing Return alone when asked for the address. (You can get back to the menu from most options in the program by pressing Return with no other input.)

Entering a Listing

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an

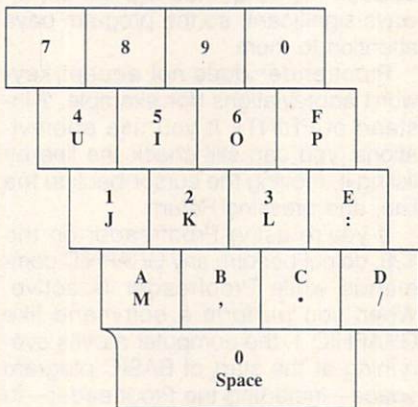
MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press Return after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

64 MLX Keypad



Only the numerals 0–9 and the letters A–F can be entered. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad function is included. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration. MLX checks for transposed characters. If you're supposed to type in A0

and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the Inst/Del key to delete the character to the left of the cursor. If you mess up a line badly, press Ctr/Home to start the line over. The Return key is also active, but only before any data is typed on a line. Pressing Return at this point returns you to the command menu. After you type a character, MLX disables Return until the cursor returns to the start of a line. Remember, press Ctr/Home to quickly get to a line-number prompt. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing and then move the cursor to the mistake and type the correct key. The cursor-left and -right keys provide the normal cursor controls. (The Inst/Del key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, Return is active; pressing it tells MLX to recheck the line. You can press the Ctr/Home key to clear the entire line if you want to start from scratch or if you want to get to a line-number prompt to use Return to get back to the menu.

Display Data

The second menu choice, Display Data, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at

which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press the space bar again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press Return.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are Save File and Load File. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. This is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Also note that the drive prefix O: is added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for save-with-replace, so be sure to give each version saved a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When you're saving a partially completed listing, make sure to note the address where you stopped typing.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. It also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT ADDRESS, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct start-

ing and ending addresses.

The Quit menu option has the obvious effect—it stops MLX and enters BASIC. The Run/Stop key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, Run/Stop-Restore also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or press any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the Clear Workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready for the results. Refer to the corresponding article for details on loading and running the program.

An Ounce of Prevention

Don't take chances—use The Automatic Proofreader to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the display option to verify that the data has been entered correctly. Test the save and load options to ensure that you can recall your work from disk.

64 MLX

```

SS 10 REM VERSION 1.1: LINES 8
    30,950 MODIFIED, LINES 4
    85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
    I,J,A,B,A$,B$,A(7),N$,
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
    4=254:Z5=255:Z6=256:Z7=
    127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
    :BS=PEEK(55)+Z6*PEEK(56)
    ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
    :S$=" " :D$=CHR$(20):Z$=
    CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
    +23:POKE I,0:NEXT:POKE
    {SPACE}SD+24,15:POKE 78
    8,52
FC 150 PRINT "{CLR}"CHR$(142)CH
    R$(8):POKE 53280,15:POK
    E 53281,15
EJ 160 PRINT T$"{RED}"{RVS}
    {2 SPACES}"{8 @}

```

```

    {2 SPACES}"SPC(28)"
    {2 SPACES}{OFF}{BLU} ML
    X II {RED}{RVS}
    {2 SPACES}"SPC(28)"
    {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
    {3 SPACES}COMPUTE!'S MA
    CHINE LANGUAGE EDITOR
    {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
    RESS{4}";:GOSUB300:SA=A
    D:GOSUB1040:IF F THEN18
    0
GF 190 PRINT"{BLK}{2 SPACES}EN
    DING ADDRESS{4}";:GOSUB
    300:EA=AD:GOSUB1030:IF
    {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
    R WORKSPACE [Y/N]{4}";A
    $:IF LEFT$(A$,1)<>"Y"TH
    EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
    ING...";:FORI=BS TO BS+
    EA-SA+7:POKE I,0:NEXT:P
    RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
    {BLK}{RVS} MLX COMMAND
    {SPACE}MENU {DOWN}{4}":
    PRINT T$"{RVS}E{OFF}NTE
    R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
    LAY DATA":PRINT T$"
    {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
    FILE":PRINT T$"{RVS}Q
    {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
    MID$( "EDLSQ",I,1)THEN A
    =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
    90,700,280:GOSUB1060:GO
    TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
    T"{DOWN}{4}ARE YOU SURE
    [Y/N]";A$:IF LEFT$(A$,
    1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
    LEN(IN$)<4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
    =MID$(IN$,3):GOSUB320:A
    D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
    $(B$,J,1):B=ASC(A$)-C4+
    (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
    0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
    H$,B+1,1);:B=A-B*C6:PRI
    NT MID$(H$,B+1,1);:RETN
    RN
RR 360 A=INT(AD/Z6):GOSUB350:A
    =AD-A*Z6:GOSUB350:PRINT
    ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
    CK+Z5*(CK>Z7):GOTO390

```

```

PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
{4}";:GOSUB300:IF IN$<>
N$ THEN GOSUB1030:IF F
{SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
{SPACE}":GOSUB400:IF IN
S=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKEL98,0:GOSUB360:IF F
THEN PRINT IN$:PRINT"
{UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:BS
=SS:FOR J=1 TO 2:IF F T
HEN BS=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"BSL$;:IF I<
24THEN PRINT"{OFF}";
HD 470 GET AS:IF AS=N$ THEN470
FK 480 IF (AS>"/"ANDAS<":")OR(A
S>@"ANDAS<"G")THEN540
GS 485 A=- (AS="M")-2*(AS=",")-
3*(AS=".")-4*(AS="/")-5
*(AS="J")-6*(AS="K")
FX 486 A=A-7*(AS="L")-8*(AS=":
")-9*(AS="U")-10*(AS="I
")-11*(AS="O")-12*(AS="
P")
CM 487 A=A-13*(AS=$$):IF A THE
N AS=MID$("ABCD123E456F
0",A,1):GOTO 540
MP 490 IF AS=R$ AND ((I=0)AND(J
=1)OR F)THEN PRINT BS;:
J=2:NEXT I=24:GOTO550
KC 500 IF AS="{HOME}" THEN PRI
NT BS:J=2:NEXT I=24:NEX
T:F=0:GOTO440
MX 510 IF (AS="{RIGHT}")ANDF TH
ENPRINT BSL$;:GOTO540
GK 520 IF AS<>L$ AND AS<>D$ OR
((I=0)AND(J=1))THEN GOS
UB1060:GOTO470
HG 530 AS=L$+S$+L$:PRINT BSL$;
:J=2-J:IF J THEN PRINT
{SPACE}L$;:I=I-3
QS 540 PRINT AS;:NEXT J:PRINT
{SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
{5 RIGHT}";:INPUT#3,IN$
:IF IN$=N$ THEN CLOSE3:
GOTO220
QC 560 FOR I=1 TO 25 STEP3:BS=
MID$(IN$,I):GOSUB320:IF
I<25 THEN GOSUB380:A(I
/3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
B1060:PRINT"{BLK}{RVS}
{SPACE}ERROR: REENTER L
INE {4}":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
LOSE3:PRINT"{DOWN}{BLU}
** END OF ENTRY **{BLK}
{2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
{SPACE}DISPLAY DATA ":G
OSUB400:IF IN$=N$ THEN2
20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
{RVS}SPACE{OFF} TO PAU
SE, {RVS}RETURN{OFF} TO
BREAK{4}{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
I=BTO B+7:A=PEEK(I):GOS
UB350:GOSUB380:PRINT S$
;
CC 640 NEXT:PRINT"{RVS}";:A=CK
:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
ENPRINT"{DOWN}{BLU}** E
ND OF DATA **":GOTO220
KC 660 GET AS:IF AS=R$ THEN GO
SUB1080:GOTO220
EQ 670 IF AS=$$ THEN F=F+1:GOS
UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
{SPACE}DATA ":OP=1:GOTO
710
PC 700 PRINT"{DOWN}{RVS} SAVE
{SPACE}FILE ":OP=0
RX 710 IN$=NS:INPUT"{DOWN}FILE
NAME{4}";IN$:IF IN$=NS
{SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
{RVS}T{OFF}APE OR {RVS}
D{OFF}ISK: {4}";
FP 730 GET AS:IF AS="T"THEN PR
INT"T{DOWN}":GOTO880
HQ 740 IF AS<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
,15,"I0":B=EA-SA:IN$="
0":+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+"P,W":G
OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
H*256):PRINT#1,CHR$(AL)
;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
R$(PEEK(BS+I));:IF ST T
HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
O940
GS 800 GOSUB1060:PRINT"{DOWN}
{BLK}ERROR DURING SAVE:
{4}":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+"P,R":G
OSUB860:IF A THEN220
GE 820 GET#1,AS,BS:AD=ASC(AS+Z
$)+256*ASC(BS+Z$):IF AD
<>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,AS:P
OKE BS+I,ASC(AS+Z$):IF(
I<>B)AND ST THEN F=2:AD
=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
>0)+1 GOTO960,970
SA 860 INPUT#15,A,AS:IF A THEN
CLOSE1:CLOSE15:GOSUB10
60:PRINT"{RVS}ERROR: "A
S
GQ 870 RETURN
EJ 880 POKEL83,PEEK(FA+2):POKE
187,PEEK(FA+3):POKEL88,
PEEK(FA+4):IFOP=0THEN92
0
HJ 890 SYS 63466:IF(PEEK(783)A
ND1)THEN GOSUB1060:PRIN
T"{DOWN}{RVS} FILE NOT
{SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
30):IF AD<>SA THEN F=1:
GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
2)-1:F=F-2*(A<EA)-3*(A>
EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
UB1010:ON OP GOTO950:SY
S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
SAVE COMPLETED **":GOT
O220
XP 950 POKEL47,0:SYS 63562:IF
{SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
LOAD COMPLETED **":GOT
O220
DP 970 GOSUB1060:PRINT"{BLK}
{RVS}ERROR DURING LOAD:
{DOWN}{4}":ON F GOSUB98
0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
G ADDRESS (";:GOSUB360:
PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
AD=SA+AD:GOSUB360:PRINT
D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
*256):POKEL93,AL:POKEL
94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
*256):POKEL74,AL:POKEL
75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
1050
CR 1040 IF (AD>511 AND AD<6528
0) THEN GOSUB1080: F=0
: RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
{SPACE}INVALID ADDRESS
{DOWN}{BLK}":F=1:RETU
RN
AR 1060 POKE SD+5,31:POKE SD+6
,208:POKE SD,240:POKE
{SPACE}SD+1,4:POKE SD+
4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
240:POKE SD,0:POKE SD+
1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
KE SD+4,0:POKE SD,0:PO
KE SD+1,0:RETURN

```

REVIEWS

GATEWAY 2000 NOMAD 450DXL NOTEBOOK

Gateway's new Nomad 450DXL was designed and built specifically for power users who want all the muscle usually found in a high-end desktop PC but who also want the convenience and mobility of a notebook computer. If you're one of those users, the Nomad is what you've been waiting for. Weighing less than 6 pounds and measuring 8.5 x 11 x 1.8 inches, it tucks easily under your arm or in a briefcase.

The CPU is an Intel 80486DXLP2/50, a new chip that consumes less power (hence the LP designation) than conventional DX2 CPUs. This low-power CPU, combined with Gateway's other power-management features, gives the Nomad excellent nicad battery life (more than two hours, even under heavy use) between recharges.

The dark, charcoal gray color and squared, no-frills styling give the Nomad a bold, handsome appearance that would be equally at home on an airline seat-back tray or on a boardroom conference table. A custom, color-coordinated, miniature hand-held trackball provides a supple and surprisingly easy-to-use pointing device for navigating your way around Windows (included with the computer) or other GUI-based applications. The trackball connects to a dedicated mouse port at the left side of the machine via a two-foot cable.

The Nomad's 10-inch LCD (measured diagonally) is a backlit, triple supertwist

unit that affords good viewing in all lighting conditions, although some of the LCD's pathways are visible when the brightness or contrast controls (dials located at the right of the display) are turned all the way up. Under most conditions this isn't necessary, however, and on the



Gateway 2000's Nomad 450DXL notebook uses a new low-power version of the 486DX2/50 processor chip.

whole the display is quite good. The Nomad is capable of displaying up to 64 shades of gray in normal VGA (640 x 480) mode. With an external monitor connected, the Nomad can provide 800 x 600 and 1024 x 768 SVGA resolutions as well, and it supports simultaneous display of the LCD and CRT. A unique feature of the Nomad is its screen inversion switch, also located next to the LCD. By changing the position of this switch, you can reverse the video display from its normal dark-on-light display to light-on-dark. This affords better viewing for some applica-

tions, although the LCD's pathways become more pronounced in the reversed-video mode.

The Nomad comes outfitted with 8MB of RAM as the standard configuration, and this can be expanded to 20MB if you need more memory. A fast Conner 200MB

Port is found at the right side for those who prefer a Microsoft BallPoint to the supplied minitrackball. The socket for attaching the AC power adapter and a compartment that houses the proprietary expansion bus connector are located at the rear of the machine.

With the Nomad 450DXL, you don't have to stay at your desktop to get your work done. This notebook makes it possible to take the power you need where you need it, easily.

TOM BENFORD

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CRICKET PAINT FOR WINDOWS

Computer Associates enters the Windows graphics world with Cricket Paint, a powerful—though somewhat confusing—paint program long familiar to Macintosh users.

This company believes that computer artists are less interested in the underpinnings of a graphics program than in working with the art itself, so it took care in putting a simple button-and-slide-bar interface between you and the program. Some will like the fact that you don't have to access dialog boxes to achieve some effects, though I found this approach unintuitive. Any Windows product that forces you to be so dependent on the manual has missed the point of using a graphical user interface.

Computer Associates warns that Cricket Paint's functionality wasn't compro-

hard drive is also standard equipment on this model, as is a front-mounted 1.44MB high-density floppy drive.

LEDs are used to inform the user of the system's status, and they're all located in a line just above the uppermost keyboard row. Power, low-battery condition, turbo mode, floppy and hard disk activity, and Caps Lock, Num Lock, and Scroll Lock status are all signified by this bank of helpful light-emitting diodes.

All the I/O ports are concealed beneath a drop-down panel door on the left side of the machine, while a Microsoft-compatible Quick-

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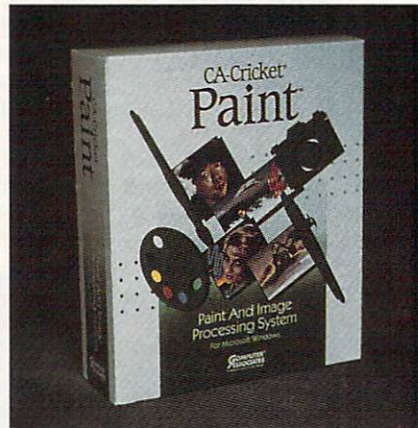
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REVIEWS

mised to suit low-end PC hardware. I used it on a 486DX2/50 machine and experienced minimal delays.

Cricket Paint for Windows works in 24-bit color. If you load a file with a more restricted palette, Cricket Paint makes it 24-bit automatically. The ex-



Cricket Paint for Windows is a part of the popular Mac program.

ception is 8-bit gray-scale files, which aren't altered. Cricket Paint's color control is very good. It offers two kinds of graduated color (and several options for selecting colors) and a wide array of masking options. You can also capture an area of a drawing and turn it into a texture (or use one of the "canned" textures available with the product). When painting, you can select any of 100 levels of opacity. You can also copy (and do most operations) in any level of opacity.

The product is almost obsessively flexible. For example, you can specify line widths to .01 of a pixel. Each tool can be used anti-aliased, hard-edged, or as an airbrush. And, as I mentioned, you can use any tool at any level of opacity. The program supports the Wacom pressure-sensitive tablet.

If you buy Cricket Paint for Windows, be prepared to spend some hours with the manual. This isn't a product you can sit down and immediately start using. On the other hand, you'll find that you have a powerful, feature-rich program that allows you to perform most ordinary functions without using menus or dialog boxes. You're unlikely to find a more powerful drawing package at a lower cost.

ROBERT BIXBY

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COMPAQ PROLINEA 4/50

Compaq's Prolinea 4/50 is a fast and capable 486DX2. Whether you have an extensive database to search, a demanding modern game to run, or Windows applications that you want to come up quickly and smoothly, this could be your machine.

The microprocessor zips along at 50 MHz in turbo mode, and the bus is of the PC/AT ISA variety. The standard configuration for this model—as well as for the other Prolinea 486 models—consists of 4MB of RAM (expandable to 32MB); one 3½-inch high-density floppy drive; a 1024 × 768, 256-color graphics controller; two additional drive bays for a hard drive and 5¼-inch floppy drive; one parallel port; two serial ports; a pointing-device interface; three 16-bit ISA expansion slots; and DOS 5 preinstalled. The Prolinea Windows+ models also have Windows 3.1 and PFS: WindowWorks preinstalled, as well as a Compaq mouse and a 5¼-inch floppy drive.

In addition to these standard features, the unit I tried came equipped with a 240MB hard drive, 5120K of extended memory, a 101-key keyboard, and a Compaq SVGA color monitor. Among the nice security features included on all of these models is power-on password protection and keyboard password protection. The unit's easy to access and expand, especially when inserting additional RAM (except that the hard drive must first be removed). There are four memory expansion sockets, which accept snap-in modules for ease of insertion. Case dimensions are about 16 inches wide, 15 inches deep, and 4 inches high, so good design is evident in the way limited space is handled here.

Upon first running the 4/50, I found that there was a little adjustment necessary for the SVGA display. The first thing I noticed was that text mode was in monochrome; I had to experiment with some paint programs to find out which video-board specification worked best for high-resolution graphics displays. One that did was a Sigma VESA driver, and a brief online search located one for nearly all my graphics utilities. Windows and Mathematica were still showing graphics in monochrome, as was text mode. More online searching revealed the source of the problem. Conversation in the message bases indicated that some Compaq Prolinea systems using Compaq SVGA color monitors come up in monochrome mode rather than color mode. More searching turned up a de-

vice driver that prevents other drivers from detecting a monochrome display. At that point, I was down to serious testing of the system with full color and full resolution on all counts.

Although Windows and DOS 5 came preinstalled, I found that there was a problem after reformatting the hard drive for a UNIX partition. Fully expecting to replace Windows and DOS upon completion, I was shocked to discover that neither was packaged with the computer. That's bad—under other circumstances, the drive head could get moved during shipment and damage the installed software. I can't emphasize enough the importance of having the floppy disks around for backup and system modification.

To test speed and smoothness of operation, I ran several power-intensive programs on the 4/50, a Data Stor 486SX/25, and a 386DX/33. These included Windows applications such as MacDraft and Hollywood—which are heavily graphics and processing oriented—and DOS applications like Dance of the Planets, Color Works, Derive, Lemmings 2, X-Wing, and DeluxePaint II—also heavily processing oriented. This test wasn't entirely scientific because Dance of the Planets runs best with a math coprocessor and Mathematica and Macsyma require one. With all appropriate tested software, the 4/50 visibly outpaced the others.

In order to obtain data not biased by my own interpretation, I also ran the Norton Utilities SI program and looked at the benchmark tests. The benchmarks confirmed significant speed differences between the three computers in both file access and processing. With an IBM PC XT 8088 running at 4.77 MHz as a base value of 1 in all indexes, the 4/50 has a computing index (CPU speed) value of 95, a disk speed index approximated at 8.2, and an overall performance index value of 66. Compare this with the Data Stor 486SX/25 values of, respectively, 54, 7.5, and 38.5, and the 386DX/33 values of 34.8, 7, and 25.5. (One note about the disk speed, however: The benchmark test reported finding an advanced disk controller, further advising that the disk controller had blocked the drive-seek timing test. Many advanced controllers will ignore attempts to move the drive heads unless data's actually being transferred.)

Standard customer support is a one-year on-site limited warranty with free technical support to callers within North America.

This seems a solid and capable computer—one I wouldn't mind having for my own use.

BRUCE M. BOWDEN

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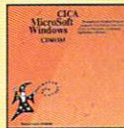
From the best British shareware library, over 600 megabytes of superb public domain and shareware for the IBM PC. This disc is biased towards the technical and scientific PC user and includes extensive sections on electronics, engineering, mathematics, medicine, statistics, ham radio and other specialist areas. Libris Britannia comes with a 124 page book describing each software package. Made in March 1993.....\$69.95*

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DESKJET 550C

Few of us watch black-and-white TV sets any more, and most of us even have color monitors on our computers. So why do we put up with boring gray-scale output? If you're looking to add a splash of color to your documents and presentations, Hewlett-Packard's DeskJet 550C printer is just what you need.

The HP DeskJet series of printers has been around awhile, providing crisp, 300-dots-per-inch output at a

low price. Last year's DeskJet 500C added 300-dpi color to the line, allowing you to remove the black ink cartridge and replace it with a color cart when you needed color on your printed output. This approach wasn't without problems. It was a pain to have to switch cartridges whenever you wanted to print color. Worse, the color cartridge had only cyan, magenta, and yellow inks, so black had to be created by mixing all three colors. This resulted in a muddy, oversaturated printout whenever you had large areas of black.

The new DeskJet 550C cures these problems by having both print cartridges on-line simultaneously and let-

ting your printer driver control the mixing. If you print a monochrome document, only the black cartridge is used. When color comes in to play, the printer driver activates the other cartridge, mixing the colors with the true black from the black ink cartridge.

Output quality from the DeskJet 550C is nothing short of wonderful. The 300-dpi text output rivals laser printing—only a very close look discerns any difference. Both gray-scale and color graphics look very good as well. The printer mixes and dithers the three primary colors and black to represent thousands of different colors. I tested the printer using the included Win-

dows 3.1 driver on a 486 PC, and using the Creative Focus Super_DJC2 driver on an Amiga 4000. The print quality on both computers was superb, with 24-bit picture files looking (from a small distance) almost like matte-finish photographs. The DeskJet uses a version of the HP PCL printer language, which tends to allow much better-looking graphics printouts than the Epson emulation used by many competing ink-jet printers. You should make sure you're using the latest HP Windows driver, which you can get from HP or download from CompuServe.

The Windows driver affords you great control over font selection; Courier and

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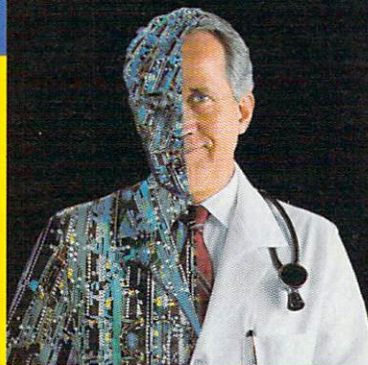
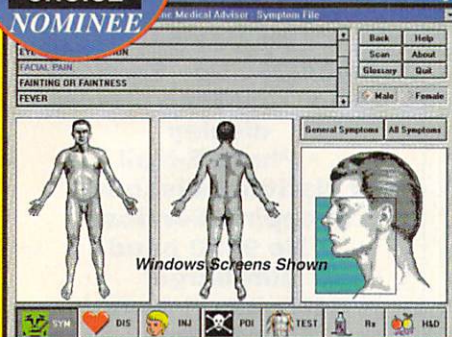
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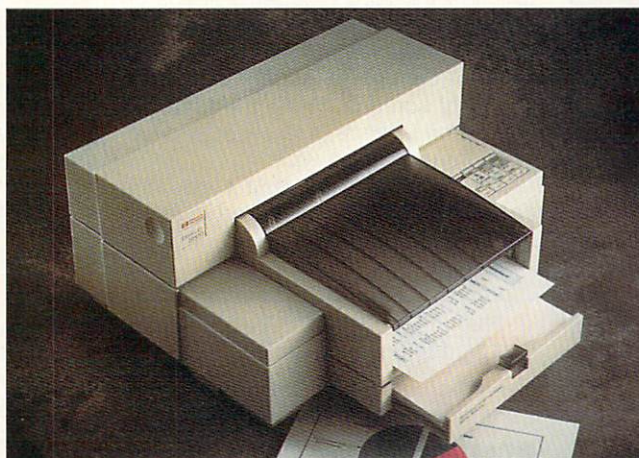
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Letter Gothic fonts are built into the printer in both portrait and landscape formats, and CG Times and Univers fonts are available in portrait format. In addition, scalable Courier, Univers, and CG Times fonts are included on the Windows driver disk. Additional fonts are available on plug-in cartridges. TrueType and ATM fonts from Windows and Compugraphic Intellifonts on the Amiga looked just as good as the built-in fonts, but printed significantly slower.

DeskJet printouts used to smear if they got wet, but HP reformulated its ink cartridges a couple of years ago; you can now spill coffee on your printouts with the best of them. The DeskJet uses regular paper—special ink-jet paper isn't needed (which is good, since it usually produces poor results). Some papers will give better results than others; I've found that Strathmore Legacy and Hammermill Laser Print papers



Hewlett-Packard's DeskJet 550C supports both monochrome and full-color printing at 300 dots per inch.

give excellent results, as do Paper Direct's fancy letterhead papers. Only single-sheet paper is supported; the paper tray supports letter, legal, and executive paper sizes, as well as European sizes. You can even print on transparency film. New to the DeskJet 550C is an envelope feeder that holds up to 20 envelopes.

Quiet, flexible (with both serial and parallel connectors), and reliable, the DeskJet 550C is a great printer for anyone bored with black-and-white.

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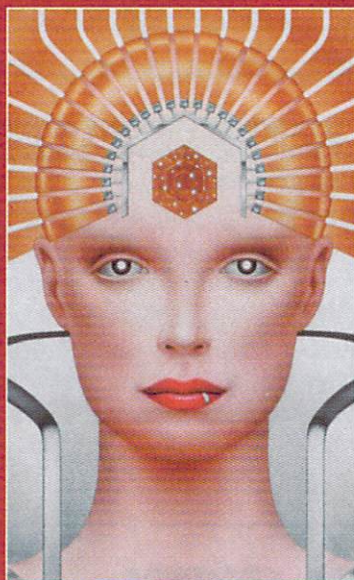
CREEPERS

Like an undercooked dish pulled from the back burner, there's something suspiciously unpalatable about this Psygnosis offering. Though eminently playable, the game lacks the spice and polish we've come to expect from Britain's premier software publisher.

Gameplay offers a potentially interesting blend of puzzle-solving strategy and real-time arcade skills. Your job is to herd creepers—caterpillars—from one section of the screen to another, dropping them into a bowl to turn into butterflies. Naturally, the path is strewn with pitfalls, ranging from lethal to simply annoying. To help the little critters along, you're given a limited number of creeper tools: swatters, girders, fans, bombs, magnets, and trampolines. Tools can be placed and removed as needed, but each action drains energy from your limited supply.

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REVIEWS

Run out of energy, and the game ends. You must rescue the required number of bugs to advance through 73 levels, arranged in four stages of increasing difficulty.

The game invites obvious comparisons to Sierra's Incredible Machine



Psygnosis' *Creepers* packs 73 levels of increasingly difficult puzzles.

and Psygnosis's own Lemmings series. Unfortunately, the puzzles lack the variety and creative flair of the hit Sierra title. The creepers also fail to evoke the lively personality and wacky sense of humor of their Lemmings counterparts.

Graphics are extremely bright and colorful, but drawn with an almost demeaning childlike quality. The game's best innovation is the Creeper Peeper, a pop-up video window that can be set to follow the lead creeper or focus on a particular area of the screen. This handy multitasking tool would've been ideal for Lemmings 2 with its large virtual play screens. Here, the feature's wasted on levels that rarely extend beyond three screens wide.

Creepers plays well, but it lacks the zest and individuality needed to stand out in this popular genre.

SCOTT A. MAY

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PENTACALC

It's really a pain to be sitting before that big, powerful computer and have to resort to your hand-held calculator for a result to be entered into the document you're working on. Windows does a nice job of meeting this need with its built-in calculator. PentaCalc, which runs under Windows, extends this basic capability with many additional features.

The program offers five modes of calculation. The basic mode is the scientific calculator, which performs all the usual arithmetic operations plus trigonometric, logarithmic, and exponential,

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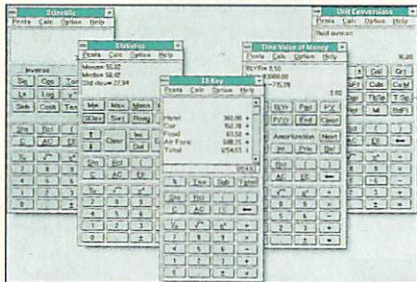
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including e^x. You can choose from binary, octal, decimal, or hexadecimal number bases for these calculations. In addition, there's a time base that lets you calculate the time difference between two dates and will tell you the day of the week of any date over a very wide time range.

Another mode is that of a ten-key tape calculator. Although limited to sim-



If Windows' simple calculator doesn't pack the horsepower you need, try PentaCalc.

ple arithmetic operations, a "tape" record is kept of the entries and operations, and you may go back over the tape to correct errors or change entries. Text labels of the entries are allowed, and you may save or print the tape. A tax key is offered that shows the tax on the current total at a tax rate you define, just like at the grocery store.

The financial mode performs time-value-of-money or cash-flow calculations. It offers convenient definition and evaluation of investment goals, and it will create an amortization table for you on your mortgage. It's a very powerful tool if you pay attention to what your money is doing—and should be doing.

The unit conversions mode is comprehensive; it converts just about anything into other units. Length, area, velocity, volume, pressure—there are 28 dimensions in all. The volume units are interesting, offering conversions between the usual quarts, gallons, and liters, along with cups, tablespoons, and teaspoons. If you need to scale a recipe for eight down to two, you might find this useful.

Finally, the statistics mode operates on a list of numbers, calculating the mean, median, standard deviation, sum, or range, as you prefer. You may edit the list to make changes, additions, or deletions. In all modes, numbers can be transferred to or from other Windows documents by way of the Clipboard.

PentaCalc is an unusual calculator, offering many features not commonly found. Fast and convenient, PentaCalc could be a most useful addition to your Windows utility library.

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TEXEL DM-5024 EXTERNAL CD-ROM KIT

Sooner or later, like hard drives, CD-ROM drives will be required equipment for even the most casual user. Though hardly a household name, Texel has a drive that boasts features comparable to those with more familiar names, and at a considerably lower price.

Texel is a subsidiary of a 74-year-old Japanese manufacturing company called Shinano Kenshi. It's been making precision motors for computer peripherals since 1962, heavy-duty commercial audio CD players (like the ones used at radio stations) since 1989, and CD-ROM drives since 1990. With credentials like that, I think Texel's qualified to compete.

This drive has some impressive features, not the least of which are its 265-ms access time and 300-kbps data transfer rate. If this all sounds like Greek to you, then think of it this way: It's about ten times slower than a fast hard drive and about two to three times faster than a floppy drive. An audio CD (the kind you listen to on your stereo) player transfers data at 150 kbps. Because the Texel is twice as fast as that, it's called a double-speed drive.

Equally impressive is its ability to read audio CDs, Kodak Multisession Photo CDs, High Sierra CDs, and ISO 9660 CDs. It's also XA compliant, which means that with a special decoder board, it won't necessarily have to slow down to 150 kbps to play the audio track on a game or encyclopedia but instead can read it at 300 kbps and buffer its output to the speakers.

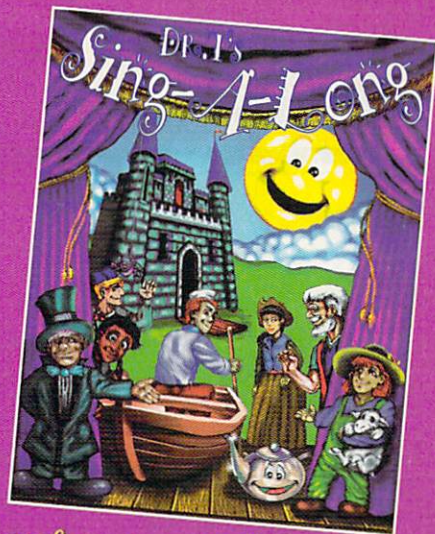
As far as compatibility and ease of installation go, I had the drive and card installed and running in less than ten minutes. The Texel operated impressively under both DOS and Windows. I also received excellent—and free!—technical support when I ran into a problem running it under OS/2.

If you need a CD-ROM drive, the Texel is well worth consideration. It's a very fast and quite reasonably priced drive with excellent technical support. It's the most drive for the money.

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ERIC THE UNREADY

Fantasy role-players get a healthy kick in the pants from Eric the Unready, a delightfully twisted text-and-graphic adventure. Packed with thrills, spills, and outrageous humor, the game is without a doubt Legend Entertainment's best effort yet.

Step inside the tarnished armor of young Eric, a fledgling Knight of the Rhomboid Table. Your task is to find Princess Lorealle, abducted by her wicked stepmother, Queen Morgana, and her lover, Sir Pectoral. Outwardly, the story follows the standard fantasy formula, replete with magic, puzzles, monsters, and miniquests. Hack away the slick veneer, however, and you'll enter a role-playing realm turned upside down and tickled till it begs for mercy. From movies and television to classic computer games, few pop culture icons escape the swath of playful ribbing.

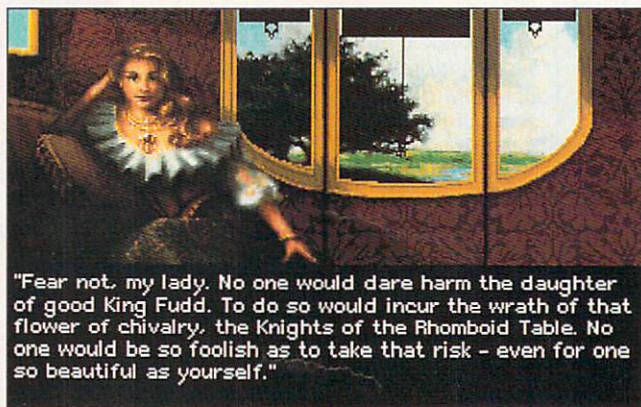
Designer Bob Bates and programmer Duane Beck have fashioned one of the slickest system architectures in the genre. Everything needed to communicate, manipulate, and monitor your progress is within easy reach on the high-resolution windowed interface. You can either type full sentences into the story window or use the mouse to assemble commands from the scrolling verb, preposition, and object menus. Other features include one-touch command buttons to display your inventory, status, and score; call up online help; run automapping; and toggle the graphics window.

Bates's text parser is intelligent, intuitive, and excruciatingly funny. Puzzles are of

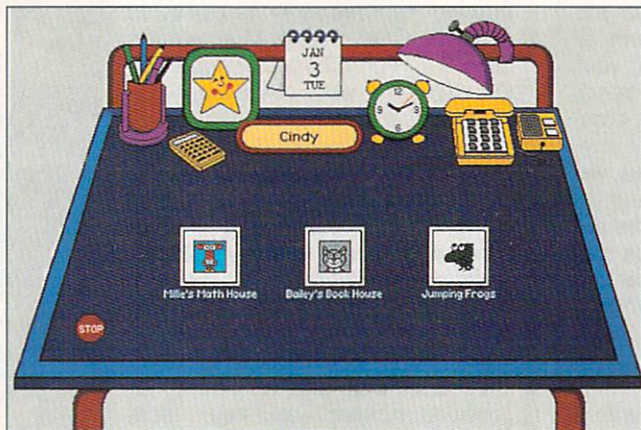
average difficulty, but they're varied enough to sustain long-term interest. Graphics are handsomely drawn and feature an exciting mix of windowed and full-screen animated art. Almost all pictures are interactive, inviting realtime participation in a wide range of settings

ic animation, stunning hi-res Super VGA graphics, and an awesome soundtrack. Princess Lorealle the Worthy has never looked so good. Also, the CD-ROM version uses only 3MB on your hard drive, a welcome benefit in the world of huge games.

Perfectly realized from con-



Legend Entertainment's *Eric the Unready* packs megabytes of humor on both floppy and CD-ROM versions.



Kid Desk lets you set up attractive and fun-filled menus for every kid in the house—including yourself.

and activities. Tastefully understated music and sound effects lend a rich air of elegance to the overall silliness of the game.

If you have a CD-ROM drive, check out the new CD version of *Eric the Unready*, which takes the same hilarious story and adds cinemat-

cept to execution, *Eric the Unready* is a rare treat that's not to be missed.

SCOTT A. MAY

Legend Entertainment
Distributed by Accolade
(800) 245-7744
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Circle Reader Service Number 441

KID DESK

EdMark's *Kid Desk* packs more fun than you'll find in any other menu program. With it, you can set up attractive and fun-filled individual menus for every kid in the house—including yourself!

Kid Desk places a colorful "menu" onscreen, but it doesn't look like a traditional computer menu; it looks like a desk. The desk comes with fun-filled accessories: pen and pencil sets you can click on to select a different desk style, an Early American scroll-top, for instance; a single date calendar that flips up to a monthly calendar that you can write on; a clock that speaks the time; a desk light that turns on or off to brighten or darken the screen; and a telephone that actually talks in many languages when you click on it to pick up the handset.

Press a three-key combination, and the program switches to Adult mode, where Mom and Dad can add programs to the desktop, set up individual menus for each child, password-protect the Adult mode with a word only they know, and select attractive icons to launch the programs they add to the desk.

Icons for each child appear on an opening menu. Children click on their own icons to launch their individual desktops. The program can be installed so that *Kid Desk* is launched when the computer is turned on, and you can configure it so that children cannot escape to DOS where they can get into grownups' files.

Almost everything here can be individualized. If you have a scanned image of your child, you can load it into a picture frame displayed

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REVIEWS

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Kid Desk offers a unique—and quite fun—menu solution just for kids, one that assures children have fun while parents' files and applications remain safe from curious hands.

CAROL ELLISON

EdMark
(206) 556-8484
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Circle Reader Service Number 442

INSTANT ROLODEX

Instant Rolodex isn't the most complete personal information manager (PIM) on the market, but it may be the perfect organizer for small-business managers. Included in this package are an electronic Rolodex, an appointment calendar, a to-do list, and sundry utilities for printing forms, cards, and labels. To make Instant Rolodex as convenient as possible, an icon bar across the top of the main window and various toolboxes access program features with a single button click.

As the program's name suggests, the Rolodex module—an address-book database using a Rolodex metaphor—is the package's focus. The Rolodex allows you not only to create and delete address cards but also to add notes to each card. Fields in the database include the usual name, address, and phone, as well as additional fields for storing alternative addresses; fax, beeper, home, and car phone numbers; important dates; and titles. Nine user-defined fields let you personalize the database to your specific needs.

More than just a straight Rolodex file, Instant Rolodex provides full database search features. You can find a card by searching the key field, or you can create subgroups of cards using search logic that compares specific fields with such operators as equal-to, less-than, greater-than, and between.

The calendar can be viewed as an entire year, month, or week, or you can bring up an appointment book for a specific day, which lists by time all activities planned for that day. Scheduling events is as easy as clicking on a time and typing a quick description. Recurring events can also be scheduled. Finally, the built-in alarm function warns you of any impending event.

The to-do list is Instant Rolodex's

weakest feature. While you can check off tasks as you do them, the tasks aren't related in any way to the calendar. In other words, all tasks appear in a single list that can be prioritized by task but not by date.

Despite its weak task handling, Instant Rolodex is perfect for business folks with modest needs. When you add its ability to dial numbers and send faxes, Instant Rolodex is a fine package at a great price.

CLAYTON WALNUM

DacEasy
(800) 222-8778
\$49.95

Circle Reader Service Number 443

THRUSTMASTER RUDDER CONTROL SYSTEM

If you spend much time flying flight simulators, you know that reaching for the keyboard can be the kiss of death. Serious sim fans have looked to ThrustMaster for relief; the company's Flight Control System and Weapons Control System put most of the controls on the joystick and throttle, respectively. This simulates the HOTAS (Hands On Throttle And Stick) approach used in modern jet fighters. Even then, though, you're still forced to use the keyboard for rudder control, which can be a deadly distraction when lining up for a difficult strafing run or landing approach.

The ThrustMaster Rudder Control System solves this problem by giving your virtual cockpit a set of authentic rudder pedals. Real aircraft use rudder pedals to control yaw—a movement of the plane's nose to the left or right without banking. Rudder pedals come into play most often when lining up for landing, conducting strafing runs, or engaging in slow air combat. If you're shooting at an enemy plane and you see your tracers are flying by just to the right of the plane's cockpit, for instance, a quick kick of the left rudder pedal will likely score a kill.

Unlike some less expensive pedals that place the footpads right next to each other, the ThrustMaster pedals are distanced almost 20 inches apart, allowing you to sit in a comfortable, natural position. (I often use them as footrests when I'm not flying simulators.) They're very sturdily constructed, built of gold-anodized aluminum and ABS plastic, which is good for a device whose main purpose is to be kicked around. The heavy construction and rubber feet on the bottom of the pedals keep them in place on wood or tile

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floors. If you're using them on a carpeted surface, some Velcro may be helpful for keeping them from getting shoved around.

Many MS-DOS flight simulators support rudder pedals, including Aces of the Pacific, Comanche: Maximum Overkill, Falcon 3.0, Gunship 2000, Flight Simulator 4, ATP, Flight of the Intruder, and A-10 Tank Killer 1.5. ThrustMaster sells a special TSR that will add rudder pedal support to Secret Weapons of the Luftwaffe. The only problem I encountered was trying to use the ThrustMaster FCS joystick controller and the Rudder Control System with Flight Simulator 4; the coolie-hat switch on the top must be disabled (requiring you to add a switch to the stick yourself) for the program to function correctly. The pedals worked fine with Flight Simulator 4 and a different joystick. I also successfully tested the pedals using an adapter cable on an Amiga 4000 running Fighter Duel Pro.

Although the Rudder Control System is a bit expensive for the occasional player, serious simulator pilots will find it well worth the money for the added control and realism it affords.

DENNY ATKIN

ThrustMaster
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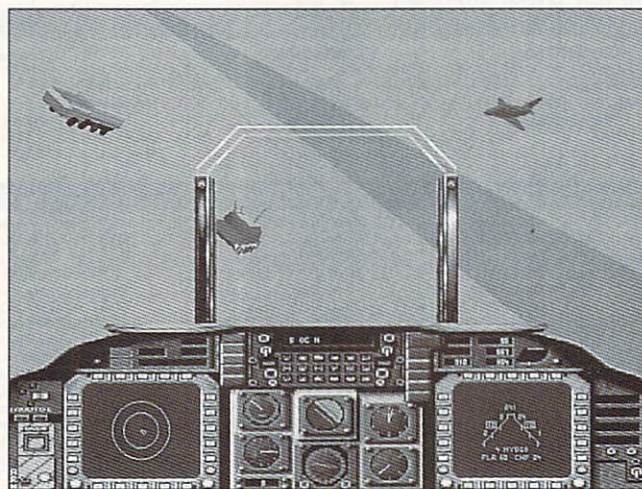
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AV-8B HARRIER ASSAULT

Like the redoubtable jump jet, Domark's AV-8B Harrier Assault takes off in more than one direction. Not only is it a flight simulator, but it's also a war game based on a somewhat unlikely, UN-backed invasion of the Indi-

an Ocean island of Timor. Likely or not, though, both elements are quite creditable. Each benefits from the other, with the result that Harrier Assault's whole is greater than the sum of its parts.

For starters, the flight sim is far superior to Domark's previous effort in this field,



Domark's AV-8B Harrier Assault is now available in a special Super VGA version for computers with S3 video chips.

MiG-29 Fulcrum, and compares favorably to MicroProse's Jump Jet. Harrier Assault flies beautifully, with a smooth-as-butter update on a 486/33 (a 16-MHz 386 machine is the minimum recommended) and a delightful view. I liked the hazy horizons and the way terrain emerges from mist as landfall approaches, lending a you-are-there sense of momentousness. I liked the slight lag to the controls, a feel more realistic than that of some turn-on-a-dime flight sims. And I liked all the stuff on the ground—even the stuff shooting at me. It's a lively place, this Timor. (Wish the explosions were spiffier, though.)

The war game is fought out on a console—a sharp SVGA screen—aboard your flotilla's flagship. Anything

that makes a computer pilot feel he's not operating in a vacuum—that the mission has more than an imagined impact on the game's flow—is valuable, and Harrier Assault conveys this well, albeit in a somewhat abstract way. It allows you to order amphibious landings, to set

nical gaffes. I consistently ran into crashes (the computer kind) when plotting mission waypoints on a zoomed-in tactical screen, and I couldn't get the mouse pointer below the top third of the screen. (There's a work-around for the latter problem—use a joystick instead of the mouse—and a fix is available from Domark.)

But that's it for flak. Otherwise, this Harrier goes up like a rocket.

PETER OLAFSON

Domark
(415) 513-8929
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Circle Reader Service Number 445

AIR BUCKS VERSION 1.2

A version number in a game's title is a pretty sure sign that the game in question is a flight simulator: Witness Flight Simulator 4.0, Falcon 3.0, and Chuck Yeager's Flight Trainer 2.0. You could hardly be blamed for figuring Air Bucks version 1.2 to be a flight sim as well.

It is, but only in an abstract sense. Air Bucks 1.2 is a substantially improved version of Impressions' well-received airline simulator, and it's first class all the way.

You're placed in charge of a startup company with a base of operations (Miami) and a little pool of money (\$100,000). Over the years (beginning in 1946), you're expected to transform the company into the talk of the industry. You can't control the weather or the baggage-handlers' union, but you do have intimate control over capital expenditures such as new planes, landing rights, routing, fares, adver-

up air missions against an aggressive, intelligent enemy, and to zoom in on individual trees, if you wish (I'm not certain what this is good for, but you *can* do it). This isn't anything especially new—games such as Falcon 3.0, ATAC, and Campaign are all variations on this strategy/action combination—but it gets damnably involving here when you know that what you do counts.

Harrier Assault doesn't have the most intuitive command screen I've ever seen, but its complexities are nicely unraveled in a substantial, plain-English manual. (But next time, use something stickier than chewing gum to bind it, folks.)

It's also at the command screen that the program commits some rather basic tech-

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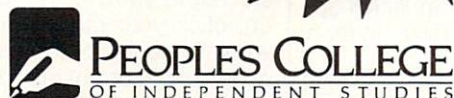
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tising, and maintenance—all handled rather elegantly via the mouse or keyboard.

Of course, there are as many as three other little airlines—controlled either by the computer or other aspiring Richard Bransons—trying to pull the same stunt. They are acquiring landing rights in the same cities and flying the same domestic and intercontinental routes. And your board of directors is watching how you do.

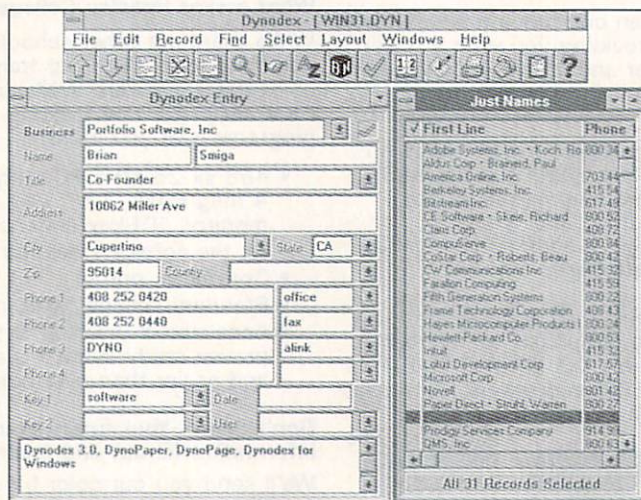
It's easy to play, even without the manuals, and easy to enjoy. (Beating out the competition is quite another matter.) There are lots of pleasant little features—especially on the fare-setting screen—and detailed financial information is always at your fingertips. You can even invent your airline's slogan—a charming touch—or pay for market research to tell how you're doing. It's all nicely knit together, so it's never overwhelming. And the hours spent in Air Bucks drift by unbidden.

Unlike some corporate sims like Black Gold (oil) or Ports of Call (freighters), however, this one doesn't have any lighthearted arcade extras (no lining up incoming planes with runway lights or extracting seagulls from a turbine engine). It's still a game, naturally, but it's also a broad business simulation as opposed to a toy. And though it has been sweetened with digitized sound, 256-color graphics, and some modest animation, it never bumps that basic premise. (The music's delightful, too; it seems to take off from Ultima VI.)

My only objections are a certain lack of integration—it would be nice to be able to see and edit everything about a route and its planes on a single screen—and the



Air Bucks 1.2 from Impressions isn't a traditional flight simulator, but is instead an innovative airline simulator.



Dynodex for Windows manages not only names, addresses, and phone numbers, but your important notes as well.

absence of online help. An *Are you sure?* requester might have headed off situations in which, for example, you assign a plane to a route that exceeds its range or neglect to assign ticket prices. (Passengers then fly free.)

For registered owners of the original Air Bucks, version 1.2 is available free as an upgrade. (There have been a host of user-suggested changes, so basically it's smarter, prettier, and better stocked with info.) Impressions also makes upgrades

to Air Bucks and its other products available through its online support area on the CompuServe online network. And if you haven't already had the pleasure of flying the not-so-friendly skies, be sure all carry-on luggage is safely stowed and raise your seat back to its full upright position. You're in for a delightful ride.

PETER OLAFSON

Impressions
(203) 676-9002
\$59.95

Circle Reader Service Number 446

DYNODEX FOR WINDOWS

Tired of thumbing through the Rolodex every time you need a name or number? Dynodex, a contacts database, can save you from this hassle and offer some options—such as printing address books and dialing your telephone—that may prove very useful to your business.

Dynodex is a Windows database application that manages the names, numbers, and addresses of those crucial to your business's operation, as well as any notes you may want to keep track of. It can print such things as address books, mailing labels, rotary cards, and envelopes. Phone-dialing options are also available. All you need to begin are an IBM PC or compatible computer, 2MB of RAM, a hard drive with 2MB of available space, a VGA display, DOS version 3.1 or higher, Microsoft Windows 3.1 or higher, a floppy drive, and a Microsoft-compatible mouse.

The Icon Palette at the top of the screen allows you to toggle back and forth between previously recorded data or enter information for a new record. You may then proceed to delete or edit the record, or you can search, select, and sort the records by specific data. There's also a List window that shows, in alphabetical order, all the records you've recorded. You can highlight the name you wish to look up, click your mouse, and voilà! There it is before your eyes. For information such as the names of cities, states, and countries, there's a drop-down list box you can open with your mouse. It will allow you to

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REVIEWS

highlight and click on the information you want to enter so that you don't have to type it yourself. The date can also be added to a record simply by clicking on the calendar shown in the Icon Palette.

Records may be listed by either the business name or the name of the contact person. You can mark records with a check mark if you wish to keep some of them separated from the rest to point out important information. Information can also be copied and pasted to the Clipboard so that you can transfer it somewhere else, such as a letter or label. Another shortcut that Dynodex offers is entering data by using short-hand keys. With city names, for example, you can simply enter the letter A, and the name *Aspen* will appear in the city field. Options like this make Dynodex quite a timesaver.

If you need to make changes to a large number of records and don't want to enter the data manually, Dynodex will change each record globally if you simply tell it what to find and the correction that should be made. If you're not sure of the exact spelling of a word, you can use a question mark as a placeholder for a letter, and Dynodex will locate words that could fit your example.

If you want to share files, Dynodex for Windows is compatible with Dynodex for the Apple Macintosh. Dynodex can also import information from software applications such as Microsoft Word and other Windows word-processing programs so that you won't have to waste time retyping data.

Dynodex is a complete contacts database, with all the options a successful business should have. For all the time that Dynodex will save you and the intuitiveness it provides, it is well worth the low suggested retail price.

KIM HAVLENA

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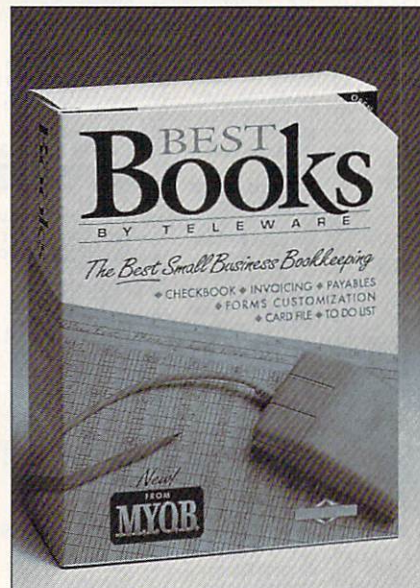
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BESTBOOKS

Though the dividing lines aren't crystal-clear, financial management software falls into three basic groups: personal finance products such as Quicken and Managing Your Money (used, too, by small businesses); entry-level accounting packages (such as DacEasy and One-Write Plus) used by small and mid-sized businesses; and professional

packages (generally sold as separate modules that integrate) used by CPAs.

Teleware—which brought us the popular entry-level product MYOB for the PC and Macintosh—has released a product positioned somewhere between the first two classes of financial software. BestBooks, at a suggested retail price of \$99, is aimed at users



BestBooks is an entry-level accounting package for home and small business use.

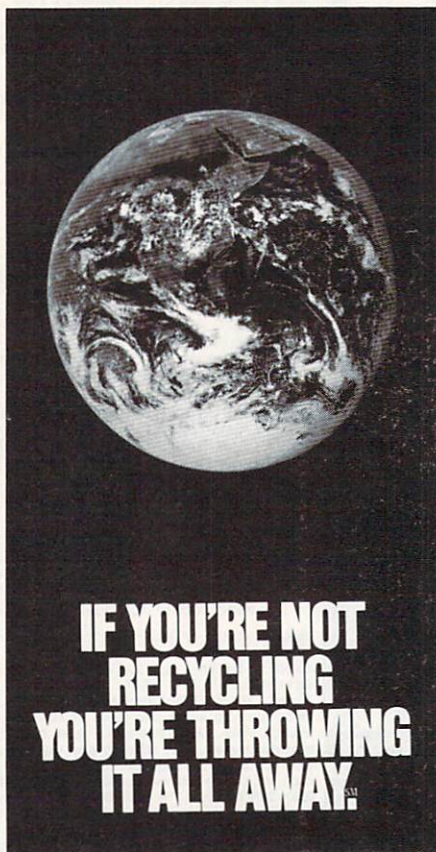
who've outgrown their personal finance packages but don't need all the features of the midrange systems.

Though it lacks sophisticated inventory tracking, purchase orders, a real-time balance sheet, P&L analysis, and customer contact management, BestBooks looks and feels much like its big sister, MYOB.

Predefined Charts of Accounts for more than 30 types of businesses make it easy for you to get up and running quickly.

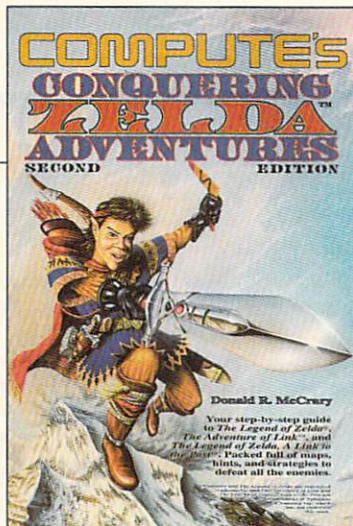
The main screen's Command Center quickly shows you that the program's functions are divided into Lists, Checkbook, Sales & Receivables, Purchases & Payables, Card File, and Administration. Click on one of those buttons, and a small flow chart in the right side of the box illustrates the logical order to go through tasks in that function. Then click on the desired function, and BestBooks pops up the correct form.

As is standard in most of today's financial software, forms resemble their real-life counterparts. You simply fill them out, customizing their layout first if you want. To speed up data entry, keystroke combinations pop up lists of your customers and vendors, for example, and "zooming arrows" give you access to deeper detail. If you're in the



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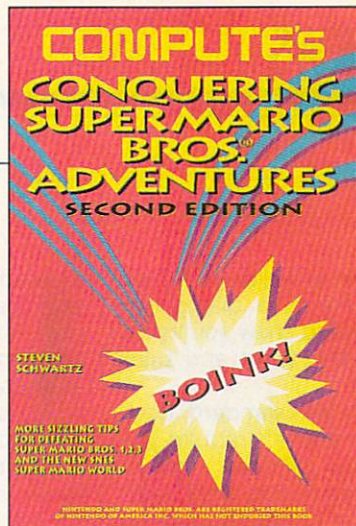
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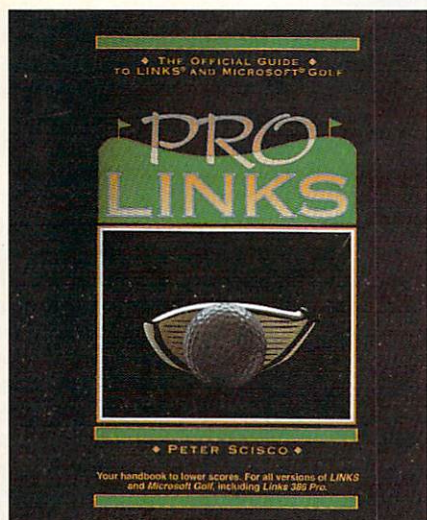
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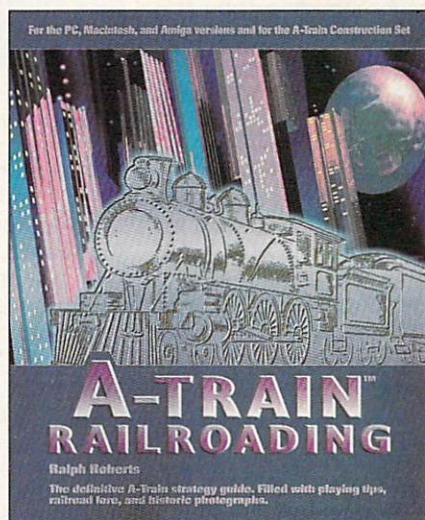
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REVIEWS

card file and click on a company name, a dialog box pops up to show you its tax and credit terms and sales history.

As is also standard, BestBooks doesn't require you to know "CPA-ese"; while it performs double-entry bookkeeping, it uses terminology easily understood by someone not well versed in bookkeeping language. And all the program's functions are integrated, which avoids repetition of data entry and, ultimately, speeds up the accounting process.

More than 70 reports can be customized and printed, including 21 financial reports (P&L, Balance Sheet, Trial Balance), six checkbook reports, and 23 sales reports. The program also lets you memorize transactions for recurring entry and post transactions alone or in batches. It prints labels, keeps an updated to-do list, reconciles accounts, and has password protection.

BestBooks lacks a payroll module, and it's not a multi-user system. But it's a great choice for many users who haven't yet found an exact fit in the accounting software market, or who've outgrown less-powerful products.

KATHY YAKAL

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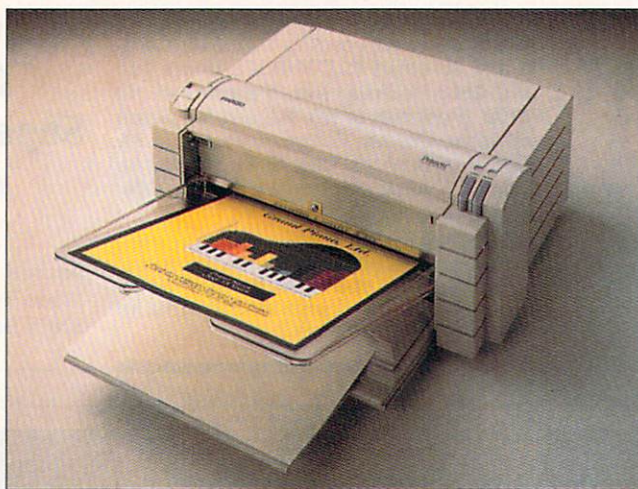
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PRIMERA

Color printing has traditionally been an expensive, time-consuming process, particularly when you're looking for the kind of color you can only get from thermal transfer printing. Fargo Electronics, a producer of bar-code printers, has attempted to eliminate the expense and delay

involved in the thermal transfer process. The Primera is inexpensive (at least when compared to other printers of similar technology) and fairly rapid (taking about 180 seconds to produce a three-color printout). But there's a catch.

First, don't be misled by



The Primera color printer from Fargo Electronics brings color thermal printing into an affordable price range.

the term *three-color printing*. The printer can produce virtually any color by overprinting. First, it prints yellow, then magenta, and then cyan. By printing these colors on top of one another, the Primera can produce shades of gray and a rich palette of colors. You have the option of purchasing a four-color ribbon that'll allow you to add true black to the palette (the black produced by the three-color ribbon is actually a dark bluish brown that's very close to black).

Although the printer's inexpensive, the supplies aren't. For \$45.00 you can purchase either a three-color ribbon that yields 115 pages or a four-color ribbon that yields 80 pages. Fargo also offers a monochrome (black) ribbon for \$39.95 that'll print 400 pages. The

special coated paper needed by the printer isn't inexpensive, either.

The printer has a resolution of only 203 dots per inch (dpi). A fax at fine resolution is 200 dpi, so if you've ever seen a fax, you've seen the kind of jaggies the Primera produces.

olution, make sure you have some very smooth paper on hand. However, for far less than the cost of this thermal printer, you could purchase a color ink-jet printer with 300-dpi resolution (or higher), and for most applications that would be the preferred course of action.

ROBERT BIXBY

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NEC READY 425

If you're looking for NEC quality and engineering but are new to computing and don't have elaborate plans for expanding a computer, take a look at the NEC Ready 425.

The name *Ready* says it all. Once you've unpacked the system and made the necessary connections, it's ready to go. That's because NEC has preconfigured it and preinstalled all the software that comes with it. If you haven't set up a computer before, don't worry. NEC includes a quick-setup sheet and a video to walk you through the steps. Once the system's up and running, you'll find an online tutorial explaining how to use your Ready. NEC provides manuals for DOS and Windows in addition to the Ready's first-rate user's manual, which is thorough, well illustrated, and well written. If you should run into trouble that you can't remedy yourself, just dial up NEC's ReadyRemote service, through which NEC technicians can check out your system and help you come up with a solution.

The Ready comes with plenty of software, leaving you ready to create a database, a spreadsheet, or a

The color registration (color alignment) of the printouts was very good, and when I used extremely smooth, coated paper (like the sample sheets provided with the printer) or acetate sheets, my printouts had dense, solid colors (the waxy thermal transfer material left a sheen, making the printouts look vaguely photographic). But when I used common photocopy paper, my printouts were spotty and plagued by dropouts where one or all of the colors didn't print.

If all you're doing is proofing pictures and all you need is an FPO (For Position Only) graphic, the Primera seems tailor-made for this purpose. If you want art-quality printouts similar to those produced by a Tektronix printer set at a low res-

chart; write reports; avoid viruses; send a fax; download a file; and use your Ready for countless other computing activities. In addition to MS-DOS and Windows 3.1, you get PFS:WindowWorks, Quicken for Windows, and WinFax UltraLITE.

The standard hardware leaves you ready to handle most computing challenges. You get 3½-inch and 5¼-inch high-density floppy drives, a 170MB 3½-inch IDE hard drive, a built-in fax/data modem (2400 bps for data, 9600 bps for fax transmission, and 4800 bps for fax reception), and a monitor capable of 1024 x 768 pixels with 256 colors. Because the PS/2 mouse port, keyboard port, parallel port, serial port, and video adapter are all built into the motherboard, all three of the system's full-length 16-bit slots are available for any boards you might wish to add. The system comes with 4MB of RAM, upgradable to 64MB using SIMMs. You also get 1MB of video RAM for the adapter and an upgradable BIOS from Phoenix. Should you ever decide to speed up your Ready, NEC provides a press-pin socket for an Intel overdrive processor.

I like the sleek design and easy access (one simple cover release) of the system box, the pleasing tactile and auditory feedback of the keyboard, and the comfortable and responsive operation of the NEC mouse. The Ready 1024 monitor performed very well on the whole. Its .28-mm dot pitch made text easy to read for long periods of time, and this monitor didn't give me the exaggerated bounce I find on so many monitors when I shift between text and graphics modes.

No system is perfect for

every user, and there are some things I missed in this system. NEC didn't include a reset button, you have to request and pay shipping and handling for floppy copies of the software, and there are no available bays for adding drives. If you want a CD-ROM drive, a tape drive, or some other drive, you'll have to opt for an external version. Because of the highly integrated system board and because the fax/data modem doesn't take one of the bus slots, the three available slots will be enough for many users—but not for all.

These problems can be worked around and won't affect the needs of many COMPUTE readers. In fact, if your computing needs aren't heavy-duty, you may well be ready for this attractive and well-engineered system from NEC.

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ternal and external Spirit II modems are priced at \$229 and \$249, respectively. They include V.42 and MNP 2-4 error correction protocols and V.42bis and MNP 5 compression protocols.

MNP stands for *Micro-com Networking Protocol*. It refers to standard protocol methods used by manufacturers of modems in providing error-free transfer of data from one computer to another. V.42bis is a similar protocol set by the CCITT organization. These protocols ensure the fastest, most efficient transfer speeds possible with the widest range of other faxes and modems.

I tried the external version of the Spirit. As long as there's a serial port available, hardware installation consists of simply connecting the fax/data modem to the computer with the supplied cable, plugging the phone line into the standard modular connector on the Spirit II, and attaching the unit's power supply. The documentation is clear, and phone support is available.

Three programs are included with the Spirit II—the Qmodem data communications software and both DosFax Lite and WinFax Lite. While all three programs work well, the Spirit II also works with other communications and fax programs. If you already have modem software installed, you can continue using the program you're familiar with while still taking advantage of the Spirit II's new technology.

In fact, after experimenting with the supplied programs here, that's exactly what I did. My regular communications software—ProYAM—worked just fine, as did the many scripts programmed in over the years.

Now the good part—the

Hayes-compatible 9600-bps modem (circa 1990) that I replaced with the Spirit II for this review is in use every day for data transfers. The Spirit II, at the same bps rates, was markedly faster in both uploading and downloading files. The bottom line: Modem technology has improved a lot in the past three years, and the Spirit II gives you the advantage of this improvement at a good price.

But what about faxes? That's the other side of this dual-purpose device—sending and receiving faxes—and the Spirit II performs well. The included fax software does that for you. If you want a fax program with more features, there's an upgrade offer enclosed for either DosFax PRO or WinFax PRO.

For considerably less than the price of a separate high-speed modem and fax machine, you can fill both functions by installing a Spirit II fax/data modem. In fact, if you were buying it only for its modem capabilities, it would still be a good deal.

RALPH ROBERTS

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VIRTUAL PILOT

Your computer setup rivals the best Air Force flight simulators. You've got a set of rudder pedals down next to your power strip, a throttle control opposite your mouse, and a joystick with more buttons than the one in a real F-18. For many games it's the ultimate in realism, but when you go to fly a Cessna or a 747, the combat-optimized joystick

doesn't exactly heighten the feeling of realism.

Enter CH Products' Virtual Pilot, an authentic flight yoke controller. For you nonpilots out there, a yoke is the double-handled device resembling a steering wheel that you find in most private planes and commercial jetliners. To bank right or left, you simply turn the yoke in that direction. To dive, push the yoke forward, and to pull up, pull the yoke toward you.

The Virtual Pilot is a large, cream-colored box that clamps onto your computer desk or table. A full-size control yoke protrudes from the front of the box, and a throttle control sits on the top right. A slider on the front of the yoke controls aileron trim, while a wheel on the front of the box handles elevator trim. Dual fire buttons on the front of the yoke can easily be pressed with your thumbs while you maintain full control. The yoke simulates joystick 1 on a PC, while the throttle simulates the y-axis of a second joystick and can be used for engine power control in most simulations. The Virtual Pilot worked fine when plugged

in with my ThrustMaster rudder pedals, making for an ultrarealistic flight simulation control environment.

So how does the Virtual Pilot compare to a joystick? It certainly makes Microsoft Flight Simulator and SubLogic ATP give a truer flight experience. Most combat games, such as F-15 Strike Eagle III, are easier to control with my CH FlightStick joystick, since rapid, jerky movements are needed in combat sims. A notable exception is LucasArts' X-Wing, which seems to lend itself well to yoke control, especially in the training scenarios. If you play driving games on your PC, you'll love Virtual Pilot! The driving experience is much more realistic when you can steer by turning a yoke—there's just something about a joystick-controlled Porsche that doesn't cut it.

An updated version, Virtual Pilot Pro, will add a coolie hat for view control.

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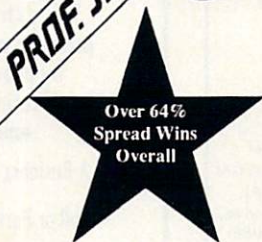
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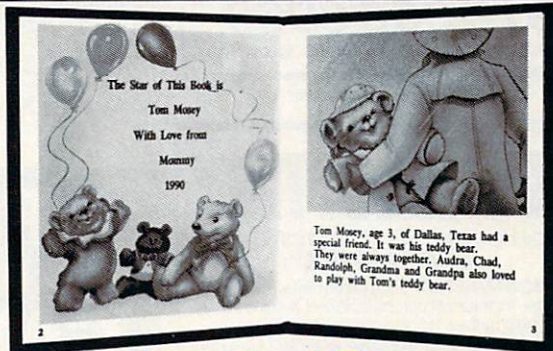
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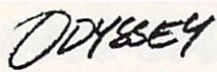
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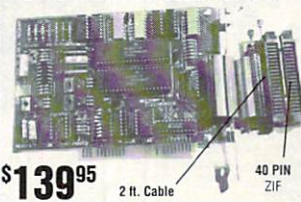
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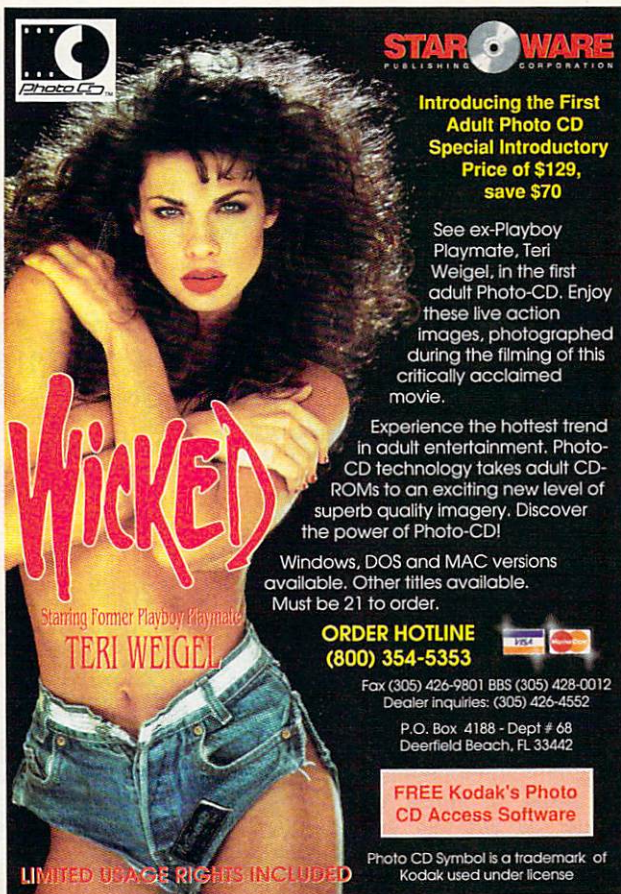


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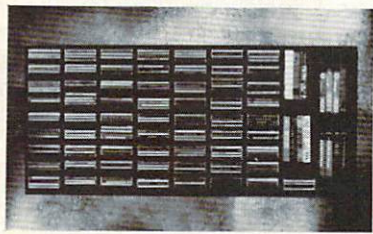
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NEWS BITS

Robert Bixby

REST AND RELAXATION

Time to recover from back-to-back compuhypefests—COMDEX in Atlanta and CES in Chicago. For me, COMDEX was boring. Favorite quote: "The problem with COMDEX isn't so much infoglut as substance anorexia." Said by: me.

Among the bright lights were object-oriented paint programs from Micrografx (the latest version of COMPUTE Choice Award winner Picture Publisher) and Fractal Design (an add-on to COMPUTE Choice Award winner Fractal Design Painter called Painter/X2). These paint programs allow you to paint or import objects on layers independent of the painting surface.

Also at COMDEX I saw an up-to-the-minute release of Micrografx Designer with a sharp new interface and tons of new capabilities, and a dye-sublimation add-on for the Primera color printer that allows the printer to create photographic-quality color printouts on special coated paper. The add-on is only \$249.95 (making the final cost of the printer just \$1,244.95). But get ready for a Kodak moment. The special paper and "ribbon" for dye sublimation printing boost the \$0.45 cost of an ordinary Primera printout to \$3.00 per page.

CES, on the other hand, was not boring. But it was really, really, really, really loud. Ordinarily, you can maintain your hearing at CES through the simple expedient of avoiding the cardiac arrhythmia-inducing car stereo area, but ever since sound moved to the PC, the CES floor has become a kind of blastfest, between the karaoke vendors, rock bands, and computer game sound effects. Each volume control has to be turned

to 11 to overwhelm the noise pollution from the next booth.

Hot stuff? Lots. Like Microsoft's new Flight Simulator, which brings greater realism to the landscape, and Space Simulator, which lets you fly to distant galaxies—even generating planets to form undiscovered solar systems. Microsoft is also releasing a collection of nostalgia arcade games for Windows, including Asteroids, Missile Command, Centipede, and (a game I never thought would make it to the PC) Tempest. These games feature early-eighties-style graphics that will surely bring a tear to the eye of every erstwhile quarter-pumping arcade junkie. Multimedia Golf features Pro Notes from COMPUTE Books' *Pro-Links: The Official Guide to Links and Microsoft Golf* by former COMPUTE editor Peter Scisco.

Great parties: Dynamix chose the Chicago Museum of Science and Industry (home port of the only WWII German U-boat in the Western Hemisphere) to showcase Aces over Europe and Graue Wölfe, its new convoy-sinking sub sim. Knowledge Adventure hired the Shedd Aquarium for the announcement of its latest how-the-heck-did-they-do-it floppy-based multimedia product, Undersea Adventure. Each introduction party had excellent food. And drink. The work of a journalist is tough, but somebody has to do it.

IBM is bundling a raft of Disney products with its latest PS/1 series of computers. The computer giant will also be putting a lot of effort into peripherals designed to be easy to install on any machine (not just IBM machines). Watch for WindSurfer, an Mwave-based do-it-all card with sound, faxing, voice mail, and so on.

Maxis will be releasing SimCity 2000, an upgrade to

its addictive SimCiy game, that allows you to import your "SimCity 1.0" cities for further development. Complete with contour mapping (and lots of terraforming tools), SimCity 2000's angled view makes your cities stand out in three dimensions. New convenience features abound.

MECC is releasing a business simulator, DinoPark Tycoon, for budding entrepreneurs. It lets you develop your own Jurassic Park-like theme park while coping with budgets, crowd appeal, and ecology. Davidson is releasing AlgeBlaster and a very exciting upgrade to MathBlaster, plus Kid CAD, a three-dimensional architecture program specially designed for children. The Learning Company is adding Math Rabbit and a new Reader Rabbit for the prereader called Reader Rabbit's Ready for Letters, plus a new adventure called Treasure Math-Storm. The competition is heating up nicely in educational software, yielding better, deeper, richer products across the board. What a great time to be small!

Sega and AT&T are collaborating on an online game-playing network. Details were sketchy, but this could give Sega a definite edge in the videogame-machine war.

Whatever your interests, your favorite games will probably appear in multimedia format on CD-ROM and on much-hyped 3DO (if software support is any predictor of success, 3DO may already be over the top). Virtually everything is being upgraded to multimedia and making use of the huge capacity of CD-ROM, which looks like the distribution medium of choice.

And to all the manufacturers I left out, watch for upcoming reviews. Despite the cold Lake Michigan wind, it was a hot time in Chicago. □

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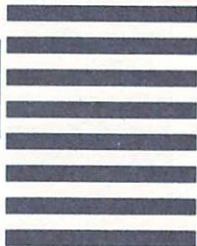
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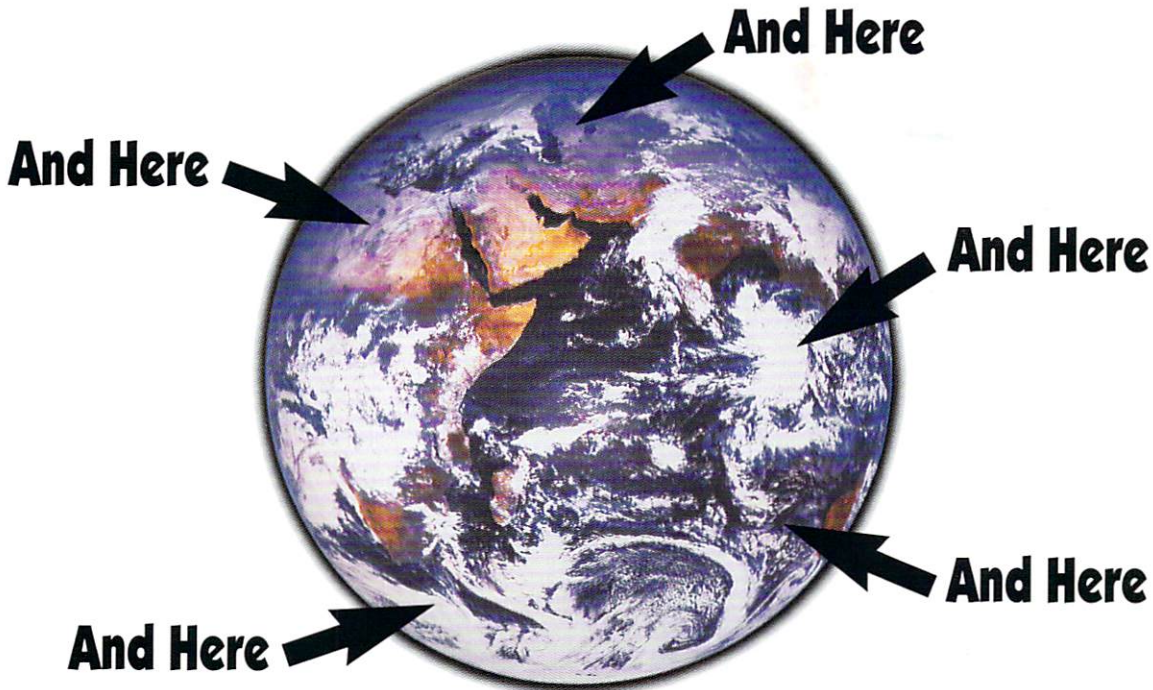
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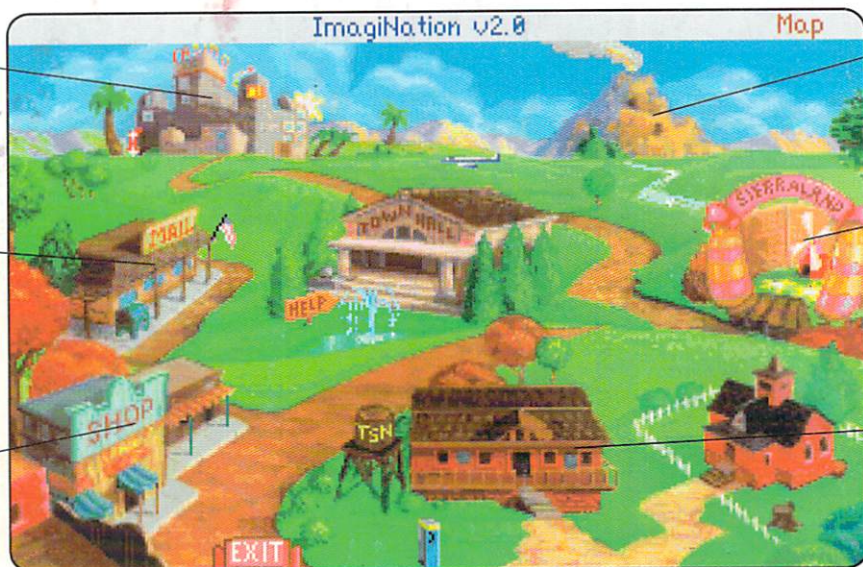
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